

## ACKNOWLEDGEMENTS

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*ADD TEAM C  
Personal Review.  
Coop. under 9 3 Teams.  
Team includes -  
vehicle on. agreed.*

*Wanted thru 9  
Mitigation vs. system*

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*by western reviews. Lott & Barker  
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- Appendix C. Heite, Edward F., M.A. Report on Industrial Archaeological Oversight, 10 Pages.
- Appendix D. Orr, Kenneth G., Ph.D. The Feasibility of the Monitorization of Buried Sites by Instrumentation At the Catoctin Furnace Historic District, 5 Pages.

Appendix E. Tabular presentation of artifacts recovered from Feature 1, Spring - Bell home check 4 18 FR 321 and analysis of such fragments.

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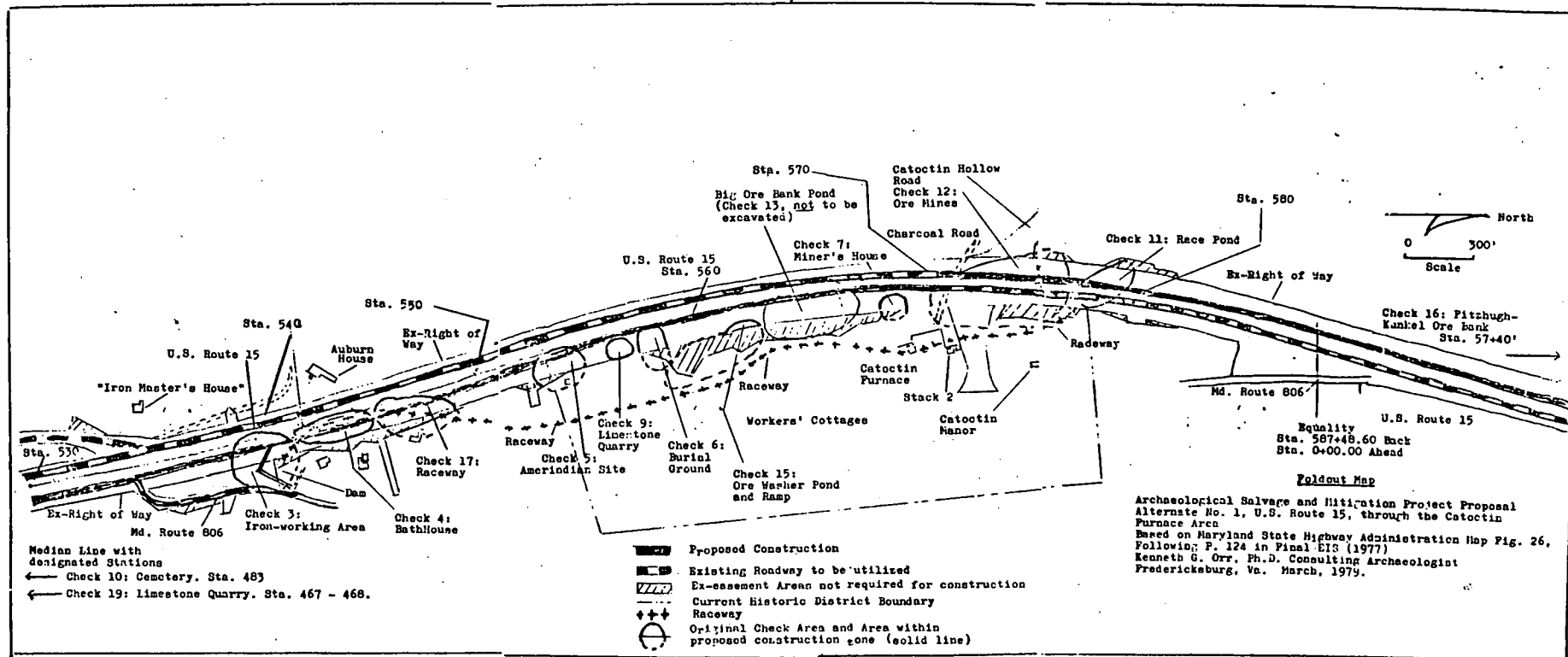


Fig. 1. Foldout Map of the Catootin Furnace Site Area.

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INTRODUCTION

Site  
(Fig 1A, B.C. map)

Objectives of present investigation

The SHA requested an archaeological investigation of those areas of the Catoctin National Historic District to be impacted by the dualization of U.S. Route 15. The areas affected consisted of the right of way of the proposed alignment which proceeded through the heart of the Catoctin Furnace iron-working complex, a late 18th to early 20th centuries site.

The objectives of the archaeological investigation were to carry out to the extent applicable the archaeological requirements contained in the Memorandum of Agreement between the SHA and the Advisory Council on Historic Preservation (May 28, 1978).

The requirements of the Agreement were designed to mitigate the adverse effects of the road dualization on the archaeological resources of the site as follows:

1. To complete the archaeological survey to identify all cultural and hisotrical aspects of the District.
2. To relocate the graves situated within the existing corridor.
3. To design a monitoring program to assess the effect of site excavation and burial on sites within the District, and
4. To outline the plans for the conservation, storage and disposition of all artifacts retrieved from the sites within the District.

The writers, who had excavated at the Catoctin Furnace site since 1975 were requested to conduct the archaeological mitigation excavation.

Methodology

Prior to the beginning of excavation a Sites Specifications and Research Designs paper was prepared and submitted to the Advisory Council in accordance with 36CPC Part 66 "Recovery of Scientific, Prehistoric, Historic and Archaeological Data: Methods; Standards and Reporting Requirements" (Orr, et al, July 12, 1979). The specifics of methodology used for each site unit is discussed along with an account of the excavations (see below). In general the approach was to bring together the specialists in the fields required by the Agreement. The investigating team included a geologist, a geological botanist, a ceramist, a physical

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anthropologist, industrial archaeologist, conservator and a team of SHA Soils and Foundations boring engineers, and a photographer.

The geologist, Dr. John L. Fauth, State University of New York/Cortland prepared a paper on geological aspects of the Catoclin Furnace site (Fauth, Appendix A). The polynologist, Dr. Jonathan W. Harrington, State University of New York/Cortland, prepared a paper on pollen analysis in the mucks of the Racepond and Auburn Dam (Harrington, Appendix B). The ceramist Ms. Betty Cousans examined diagnostic sherds recovered in the excavations and her input was directly put in the artifact analyses below. The physical anthropologist, Dr. J. Lawrence Angel, Smithsonian Institution, conducted laboratory analyses on the skeletal remains from the Slave Cemetery, Check 6 (Mid-Atlantic Archaeological Research, Jan. 1981, Appendix 2). The skeletal material of both the 1979 and 1980 excavations are in the charge of the Head Curator of Physical Anthropology at the Smithsonian Institution. The industrial archaeologist, Edward F. Heite prepared an overview report (Heite, Appendix C). The conservator, Mrs. Edith Dietz, assisted in the preparation of a "cultural Materials Conservation Plan" which is given below. The team of SHA Soils and Foundations boring engineers under the direction of Dr. Fauth put down a series of borings in the mine and pond areas of the site (Fauth, Appendix A and 4 maps). Ron Houghton was photographer.

Three excavating teams and the specialists mentioned above were assembled and excavation began in July 1979. Team A, under the direction of Dr. Alex Townsend, John Milner Associates, conducted excavations at Check 3(18FR320). The results comprise Volumn 2 of this report. The mitigation objectives were not achieved in the 1979 excavation and excavation continued into 1981. Team B, under the direction of Ronald Thomas, Mid-Atlantic Archaeological Research, Inc., conducted excavations at Checks 5,6,7, and 16. Mitigation was not completed on Check 6, burial ground during the 1979 season and the results were presented as Volumn 3 of this report. The site was subsequently completed in 1980 (Mid-Atlantic Archaeological Research, Jan. 1981). An interim report was submitted to SHA when it became apparent that Checks 3 and 6 would not be completed as expected due to events beyond the control of the Consultant of the project. Check 3 proved more complex than anticipated, and Check 6 site still contained a few burials that were unexcavated at the end of the contract. (Orr and Orr, Feb. 1980)

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committee*

The methods of excavation varied according to the nature of the archaeological features and included backhoes (fills, mine and race-way features), grade-all (overburden), long handle shovel and trowel with 1/8th inch screen sifters (culture-bearing strata), and dental tools, brushes and air pumps (burials). The finds were located in 3 dimensional space with a 2' contour map (50' to the inch) on which the median stations of U.S. 15 were recorded as locational references along with a few U.S.G.S. benchmarks. For vertical location datum planes were erected with efficient string and level instruments, and horizontal location came from 5 foot grid systems. Each system was tied in the median station- benchmark system with standard emergency equipment. The map was provided by the Maryland Division of

Archaeology and the SHA. The artifacts and cultural materials were treated under the direction of Mrs. Edith Dietz whose report was given to the writer as recorded below.

*Appendix* → Cultural Materials Conservation Plan.

Mrs. Edith Dietz, of the Smithsonian Institution Conservation Laboratory, was the conservator of the project. She visited the site to work in the field laboratory a total of 8 times during the course of the excavation. Her conservation plan for cultural materials visualizes two phases (1) the field, and (2) the depository or museum.

The field phase requires first aid to "needy" artifacts and temporary stabilization as required. The depository phase requires additional and permanent stabilization for all cultural material and possibly restoration. We were concerned with the field phase only since the cultural materials have been turned over to the Maryland State Archaeologist for disposition in the Division of Archaeology laboratory in Baltimore. Mrs. Dietz's role was to set up a field lab and to prescribe field phase treatment for the artifacts. The excavating teams were to carry out her suggestions in preparing the cultural materials for shipment to the depository.

The categories of cultural materials included: metal (principally iron), wood, ceramics, glass, and miscellaneous (including slag and stone), and skeletal material. This is a typical pattern of materials for the historic Euroamerican site. The one Amerindian site (Check 5) contained only a few fragments of stone which presented no problem of preservation.

The treatment for skeletal material was simple and effective: (1) remove gross adherences of soil, and (2) allow the bone to dry out gradually over a period of weeks. This was accomplished in a dry attic over the kitchen. Dr. J. Lawrence Angel, of the Smithsonian Institution, was the physical anthropologist of the project. He was well pleased with the success of both the excavating techniques and the field phase conservation techniques as he was able to analyse the bulk of the burials. The original condition of the bone ranged from poor to good. The final deposition of the skeletal material is hopefully in the Smithsonian, as requested by Dr. Angel who considers the Catoctin Furnace burial ground collection both unique and valuable. New regulations require that the archaeological service of the Department of the Interior must be advised in the case of an ethnic (Black) cemetery so that concerned organizations of that ethnic group can be referred to for possible suggestions on the final deposition of the bones. While in the

Smithsonian the bones have been hardened, analysed and placed in permnant storage boxes.

Ceramic, glass and stone artifacts were uniformly in good condition and required only washing. Iron artifacts varied in condition ranging from good to very poor. Nails, for example, were often reduced to rust. In general the older the iron artifact was the more oxidation it had undergone. Some, with good drainage conditions, were in fair to good condition. This was because the ph factor of acidity-alkalinity was about 7.5 in a total scale of 14 - or nearly neutral. This relatively stable condition in regard to salinity was also reflected in the condition of the mountain water used to wash the artifacts. Nevertheless Mrs. Dietz prescribed boiling the iron artifacts in distilled water and storing them in non-humid, cool conditions. It proved very difficult to control the heat and humidity in the old building used as lab since air conditioning was lacking. Nevertheless efforts to control the humidity was partly achieved by the use of plastic wrapping and containers. And throughout most of the year the house was cool.

Wood artifacts also proved difficult on account of humidity. Here the requirement was for slow drying and avoidance of excess dryness. This could be partly achieved by the use of plastic containers.

Mrs. Dietz preserved a number of spikes, large nails, and other iron objects (Check 3 iron pan), as well as wooden objects (Ck6, casket wood). A iron clasp knife with tortoise shell handles (found under the Auburn Dam bank at Check 17, Trench 1) was also preserved. Mid-Atlantic Research treated a number of coffin nails to facilitate their type identification as a chronological indicator. Milner Associates also treated some sprue and gates found as a by-product of the casting process (Check 3) by the electrolysis process restoring them to prestine condition.

The use of air conditioning and a special lab area provided with running water is recommended for future field laboratories. However inadequate the storage facilities (especially for iron), the low salinity and temporariness of the phase were saving factors. In regard to suggestions for the permanent storage of the artifacts in the depository in Baltimore, Mrs. Dietz reiterated it was of vital importance to place the responsibility for the artifacts in the capable hands of a trained conservator.

#### Suggested Monitoring Program

As a result of the intensive survey of the Catoctin Furnace (Orr and Orr, 1977) it was suggested that the dualization alignment of U.S. 15 might have the effect of protecting rather than destroying archaeological sites where the road overlays the site like a blanket. Interest was shown in this possibility and the writer was asked to assess the feasibility of such a program at one of the sites excavated during the 1979 season. Check 4, Feature 1, Spring-bath House was considered appropriate for such experimentation. The site was excavated and recorded with the view of providing a laboratory of instruments attached to record the severity of changes due to vibration, compression, torque, chemical changes and

the like resulting from U.S. 15 north-bound alignment in operation some 7 feet above the site. Check 3, old forge/foundry, had been suggested as a possible site. It, however, was very thin (just a layer of rocks in spots) and indeed has survived largely because of the several road "blankets" which covered it. However, the opportunities of attaching instruments to gauge road-created stress is much more promising in the Spring-Bathhouse site which presents a series of situations in a 3 foot thick stratum for testing. The SHA Bureau of Soils and Foundations would be a cooperating advisor for such a program since this organization habitually deals with similar problems of the effect of the road on underlying strata. The rationale of such a program is given in Appendix D.

*Site Specifications and Research Design vs. Work Accomplished*  
- (Mitigation Summaries)

Archaeological mitigation consists of approaches and devices for lessening the adverse effects of the impact of construction on archaeological resources (Advisory Council on Historic Preservation, Jan. 30, 1979, pp. 6074-6077). The nature of the adverse effect on archaeological sites of the construction for the dualization of U.S. Route 15 was determined in the 1977 intensive survey (Orr and Orr August 1977). The basic objectives of this report are (1) to determine the extent to which the 1979 excavations satisfied the mitigation requirements of the project, and (2) to define and propose additional mitigation activities if required. Following is a short summary of the mitigation factors for each site in the 1979 project. The mitigation requirements for the project were spelled out in a paper which was submitted to the Advisory Council on Historic Preservation prior to the beginning of excavations in July 1979, and are reviewed with each site report (Orr et al, July 12, 1979)

### Check 3, Iron-Working Site (18FR320).

The conjectured forge located in the eastern area of the site and partly under Md. 806 was determined to be unaffected by the proposed road construction. Its contingency funds were allotted to the excavation of the Old Forge in the western area of the site.

Due to the extent and complexity of features in the western area of the site they couldn't be satisfactorily mitigated within the allotted time. Specifically, the impacted area of the site represented a multi-purpose iron-working unit(s) with many of its functions (such as water power pits, forge hammers, and the like,) still be be unearthed. Edward Heite, Industrial Archaeologist, of the project, has indicated that a logical model for the Old Forge site is probably the Charlottesville Middle Forge (northern New Jersey). Here a series of small water wheel with undershot current in water trough shared by all the wheels in turn was seen. The wheels powered hammers, bellows and other machinery of an iron-working unit (Lenik, 1974).

I am informed by Tyler Bastian, Maryland State Archaeologist, that the necessary additional work to complete mitigation has been performed (Feb. 1982) and that a report on this site may be expected in 5 months or so. It is noted that the mitigation of the Auburn Dam has been completed as a result of the present excavations of Check 17, Trenches 1, 6, and 7, and the intensive survey (Orr and Son, 1977, pp. 8-17). (John Milner Associates, July 1980, which is Volumn 2 of this report).

Check 4, The Spring-Bathhouse Site (18FR321).

It is believed that the archaeological findings at this site provide satisfactory mitigation for the adverse effects produced by the overlay burial of this site by Alignment 1. Since the site was utilized until about 1915 much data is to be expected from an oral hisotry project. Land records research has already given vital data in the form of the Fitzhugh-McPherson surveys map of 1858 (Courtesy of Mrs. Marie Burns of the Catoctin Furnace Historical Society). The site has been selected for monitorization. (Orr and Orr, Vol. 1).

Check 5, Amerindian Site (18FR322)

This site was an Archaic Period transient camp. Since it is likely that little or no permanent or semi-permanent structures would have left remains it is recommended that no further archaeological investigations be considered necessary for mitigation purposes (Mid-Atlantic Archaeological Research, Vol. 3).

Check 6, Historic Cemetary Site (18FR323).

Twenty-six burials were removed by MAAR in the 1979 excavation and an addition 9 burials in 1980. The remains are now in the laboratory of Physical Anthropology, Smithsonian Institution where all adult skulls have been identified as negroid by Dr. Lawrence Angel (MAAC, Jan., 1981, Appendix 2). The complete removal of the skeletal materials and adequate study of the burial ground constitutes satisfactory mitigation. (MAAR, 1980 is Vol. 3 of this rep.)

Check 7, Miner's House (18FR324)

The yard of the Carty House was excavated by MAAR. The features found including a subsurface trash deposit, brick walk, slabs and posholes associated with the house (outside the right of way). Numerous postholes tested the entire area. No further excavation is considered necessary to assure the satisfactory mitigation of the area.

However, the Advisory Panel requested that the house foundation be protected from construction activities by being filled with sand. At present the advice of the Bureau of Soils and Foundations has been sought for the best method of so protecting this site. (MAAR, 1980-V.3)

Check 9, Limestone Quarry (18FR325).

The "aborted" limestone quarry revealed sufficient details concerning its archaeological situation to be considered mitigated for the overlay impact anticipated result of road construction. (Orr and Orr, Vol. 1).

Check 10, Exhumed Cemetery (18FR326)

This site did not required mitigation as it represented a family cemetery and not an historic site. If skeletal material remained following its exhumation by the SHA crew several years ago, there is no evidence of this and little likelihood of such being disturbed by the proposed impact of the area in road construction. (Orr and Orr, Vol. 1)

Check 11, Race Pond (18FR327)

The race pond investigations included backhoe and hand excavation observations, and ten borings. The borings put down into the pond and in the vicinity to get subsurface knowledge revealed an iron mine under the pond. The observations included studies of raceways outside the right of way as necessary to understand the impacted area. A study of the pollen of the pond was also undertaken. In view of these detailed concerns it is believed that the area is sufficiently mitigated and that construction can proceed. (Orr and Orr, Vol. 1). A Geologist and Polynologist assisted the analysis.

Check 12, Iron Mines and Charcoal Road.

The three iron mines, Features 1, 2, and 4, were explored by backhoe and Feature 2 and 4 were examined by borings. Geologist Fauth conducted the investigation of the mines with the writer. The Charcoal Road (Feature 6) was excavated with backhoe and by hand revealing two terraces with an earlier and a later road. In view of the detail collected and the apparent clarity of the synthesis interpretation of these features it is believed that further excavation for mitigation will not be necessary. (Orr and Orr, 1982, Vol.1).

Check 15, Ore Railroad (18FR329).

Excavations and observations on this sliver of the extensive Big Ore Bank complex have been satisfactory to clear the area involved of further mitigation responsibility. The iron ore mine will require extensive excavation including exploration of the mine proper which is at present some 38 feet deep (90 feet at the uphill area) half filled with muck and water. Oral history related that the original mining tools are still intact. (Orr and Orr, 1982, Vol. 1)

Check 16, Fitzhugh-Kunkel Ore Mine (18FR330).

The entrance of the mine was excavated by the MAAR team but found that the 1960 road construction had rearranged and destroyed this area. Some data was gotten to suggest the presence of several roads in this area - which may be successfully excavated just to the west of the right of way at the entrance of the massive ore mine. (MAAR, 1980, Vol. 3). As much as possible was done to mitigate the archaeological resources - previously destroyed in the road construction.

Check 17, Raceway (18FR331).

The backhoe trenches exposed no less than 3 hydraulic power systems for the total time period of the furnace. Although primarily devoid of concentrations of artifacts sufficient were found by handwork and screening to substantiate chronological interpretations. It is believed that sufficient had been done of the area impacted by the right of way so that additional mitigation here will not be needed. The raceways outside the right of way, however, present possibilities of detailed interpretations of the systems. (Orr and Orr, 1982, Vol. 1).

Check 19. Limestone Quarry and Kiln (18FR332).

The limestone kiln of this site was determined to be too close to the road (on the shoulder) to be excavated. It was located under approximately 6 feet of shoulder soil, the removal of which would have imperiled traffic. The trenched cut into the base of the quarry by a backhoe was sufficient to provide mitigating data and further excavations will not be required. (Orr and Orr, 1982, Vol. 1)

## SYNTHESIS OF 1979 AND EARLIER EXCAVATIONS AT CATOCTIN FURNACE

### Synthesis Objectives

Having presented the 1979 excavation results we are now in the position of attempting to put together the jigsaw pieces from the excavation with data excavated in 1975, 1976, and 1977 (Orr and Orr, 1975, 1976, 1977). Comparative information on the iron industry in the United States and in Great Britain will be helpful in organizing and interpreting the Catoctin Furnace findings. The overall objective is to outline a feasible paradigm of what happened at Catoctin Furnace from the beginning of the iron industry in the latter part of the 18th century until its termination in the early part of the 20th century.

As in all meaningful archaeological analyses, one hopes to have arrived at the historical truths of a site by close attention to the evidence. And as in all such analyses archaeologists are forced to consider hypotheses, in lieu of conclusive evidence, which may later be proven incorrect. The science benefits from fruitful hypotheses however erroneous, for these provide targets on which future research will zero-in. However, as in the case of our specific site analyses we will continue to keep observable fact separate from conjecture and interpretation.

Our synthesis will also organize the presentation around basic problems involved in iron production. We need to know how the vital functions of the iron-making process were carried out at Catoctin. Several factors determined the location of the early ironworks. The most important of these factors are adequate supply of ore, an abundance of wood, and sufficient water power. Then too, the technical equipment and iron-producing capacities of the furnaces in the Catoctin complex must be kept in mind for evaluating the industrial features and artifacts. The social dynamics of the Catoctin Furnace population is also a focal point for interpreting finds related to the lives of the people.

The questions of cultural change over the more than 150 years of continuous occupation of the site is posed for interpreting meaningful time periods into which the finds may be divided. It is proverbial in archaeology that a site has a beginning, an end, and a portion of time stretching in between. But we hope to arrive at meaningful time phases as a means of understanding the processes of cultural change which took place. We will undoubtedly raise more questions than we provide answers for. But we hope to erect a framework within which future studies of the site may relate their contributions. (Bining, 1979; Walker, 1974; Kurjack, 1954; Gale, 1979; Flower, 1975; Trinder, 1978).

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The Furness Complexes

Historical Data

The history of the Catoctin Furnace variety of owners from 1774 to 1911 is spelled out from studies of public documents mainly in the Fredrick County Courthouse by Little and Israel (1971) and the National Heritage Corporation (1975). We will refer to these compilations in connection with specific sites. It is well to note also that the deeds, wills, tax assessments, sales advertisements about Catoctin Furnace over the years has resulted in an excellent coverage of the physical plant, and a good check list for the archaeologist.

A secondary source on the origin of the first furnace complex is of immediate interest to archaeological analysis. The account was written by J.H. Alexander in his report on the Manufacture of Iron addressed to the Governor of Maryland. This information was obtained from James Johnson of Baltimore, a descendant of the early owners of the furnace about 1839 and was furnished within forty-three years of the alleged building of the stack:

"Catoctin furnace, situated about twelve miles northwest of Fredericktown, and within a mile of the present (1840) furnacestack was built in the year 1774 by James Johnson and Company and was carried on successfully until the year 1787; in which year, the same company erected the present furnace 'about three-fourths of mile further up Little Hunting Creek, and nearer the ore banks'" (in Porter, 1936)

Dr. Charles W. Porter, Assistant Regional Historian of the Richmond Office, National Park Service, had been asked to assess the historical significance of the site within the park area. Although initially encouraged by what he found out about the present furnace area he decided that the furnace which provided supplies for Washington's army was outside the park area to the south. He was supported in this interpretation by "the best authorities on the history of the iron industry in Maryland, notably, J.T. Singewald and J.M. Swank" (Porter, 1935, p.2). With the assistance of an archaeologist Enslow, Porter visited the "Auburn" area 3/4th mile south of the present furnace area and discovered a stone-faced dam, and reports of masses of iron and slag. Singewald had visited the same area and wrote "The bank back of Dr. McPherson's house (Mine: Auburn Manor) was opened in 1774 by James Johnson and Company and the ore smelted in a furnace erected on the property" (Singewald, 1911, p.201). He thought the original furnace was "Back of Dr. Mcpherson's house". (Mentzer, 1972)

Historical research conducted by William J. Renner from 1935, when he was foreman of the W.P.A. archaeological project under Enslow, to the present also supports Alexander's position.

## Archaeological Data

Stack #1 (Median 571+75'). Little and Israel (1971) conjectured that Stack #1 of the present furnace complex was located 50' to the west of Stack #2, the one intact furnace of this complex. They thought the ruin directly to the north of Stack #2 was a "water house". Renner, however, claimed that oral history indicated that the ruin to the north was indeed Stack #1. We excavated a test in the area indicated by Little and Israel and as the location of Stack #1 and found a mass of large rounded pebbles (Test #9, F04, Orr and Orr, 1976). The test was directly below the large niche in the stone retaining wall. This site was interpreted as the location of a water wheel. Renner's ruin was examined revealing at the top a circle of baked clay interpreted as the insulated top of a bosh of a furnace. The front of a stone structure with the top of an indentation believed to be the hearth area was seen. The south stone wall of this structure was shared with Stack #2 casting house.

Stack #2 (Median 571+20'). The restoration of the existing stack required excavation of the casting house area. The area had been previously trenched and the site identified by Enslow. (1935) Renner was the foreman for this job. Our excavation explored the sand casting floor and the hearth area. A pig iron ingot and hauling gear were found. Artifacts included white ironware and drawn and cut nails which agreed chronologically with the time period of the stack (1856-1893). The presence of charcoal fragments in the lower layers gave way to coal cinders in the upper layers. This indicated a shift in the fuel source of the furnace from wood to coal during the life of the furnace. The copiousness of the cinders suggested that the cinder notch was being used to ladle molden iron into casts (e.g. hollow ware) in the later period whereas the red sand molds of the "sows and pigs" were plentiful indications in the earlier period of the production of pig iron. (Orr and Orr, 1975)

Stack #3 (Median 569+25'). A series of 6 tests were cut into the Stack #3 site which was correctly identified by Little and Israel (1971) although not excavated at that time. The tests were for the purpose of fitting cleats to support the sagging retaining wall to the west of the site (Orr and Orr, 1976). The tests revealed stone service pits with a brick floor and iron poles for attachment of machinery since removed. Iron tools, glass fragments, and nails were found. The remains were identified as belonging to the engine room which provided steam power for the hot air blowers and a hoist which loaded the stack. The coke furnace was in blast from 1873 to 1903. The stack was completely dismantled by 1905 and a mound several feet high and some 75 feet in diameter marks the remains. Contemporary photographs show this plant in operation (Little and Israel, 1971, Plates, 1a, 2a). Renner mentioned a pond in the middle of the retaining wall area just to the north of Stack #3 which was used to water the horses and mules used in the mines. (Renner Map, 1975)

Stack #1, Conject. Position, South Complex. Several years ago William Renner was associated with the excavation of his son-in-law's garage at location Median 597, east 150'. He reported that at a depth of 1' and below red-streaked sand with other furnace tailings were encountered in the digging. The strata represented the highly distinctive casting house sand resulting from the molding of pig iron. Since Renner had extensive experience in the casting house strata of Stack #2 (1936) he was convinced that the garage excavation had revealed a similar casting house. Some large stones such as would indicate the foundation of a furnace were found here, earlier several iron bands similar to those used to hold furnace stones together were found. The stone irons had since disappeared. Renner believes that the stones had been removed en toto and the stack rebuilt in its present position in accordance with Alexander's 1840 report given above. We observed a deep and wide raceway extending from the north which could have provided an extensive water current for an undershot wheel. The raceway was connected with the Auburn Dam raceway system of Check 17 but the section leading up to the conjectured Stack No. 1 location represented a "U"-shaped type associated with the earlier hydraulic system A (Trench 1, Feat. 2, Trenches 6,7, of Check 17) rather than the later "L"-shaped type associated with Hydraulic System C (Trenches 1,2,3, Check 17). The conjectured Stack #1 site was outside the right of way and excavation was not authorized.

Check 19 (Median 467-468), Check 9 (556+50), Limestone Quarries.

No direct connection was established between the distant Check 19 limestone quarry. Check 9, limestone quarry, appeared to be a small abortive effort. The limestone quarry report in 1811 sales advertisement to be within 600 feet of the existing furnace complex is still undiscovered. (Little and Israel, 1971, p.40)

Check 14, Paint Mill (Median 562+50). Singewald (1911, p.147) mentions the Paint Mill "...the Catoctin Mt. Iron Co. was formed (1888) which lasted until 1892. A paint mill was erected and operated for several years during this time producing blue, red, and yellow ocre from the banks north of the furnace which are in operation at the present time" (Fitzhugh-Kunkel ore mine). The site consisted of a stone foundation about 30' square with a mound of bricks extending an additional 35 feet to the south. Several yellow bricks with glaze on one side indicated the presence of ovens or kilns for roasting the limonite. The brick extension was a stack remembered by oral tradition. Mentzer locates a paint mill with ovens and a stack in the same position, and a saw mill and grist mill some 100 feet to the east and side by side (Mentzer, 1974, p. 5 map). The paint mill and the other 2 mills were part of the intensive survey (Orr and Orr, 1977). The paint mill at that time was included in the easement area and was tested by excavation. The conjectured saw and grist mills were outside the easement area. Each of these features were outside the right of way and therefore did not qualify for attention in the 1979 excavation.

Check 3 (18FR320, Median 539-542), South Complex.

Due to the complexity of this site, its excavation was not completed in 1979 as expected but continued into 1981. The conclusions drawn in this report are therefor on the basis of the 1979 report which forms Part 2 of this report, and the intensive survey results which was the initial excavation of the site (Orr and Orr, 1977, Check 3, pp. 8-17). The 1977 report revealed three areas of archaeological interest (1) Feature 2 which was seen as a forge and/or foundry, (2) the Auburn Dam, which provided the water power for (3) a conjectured forge located under the road bed of Maryland Route 806 which joins U.S. 15 nearby. During the 1979 excavation the project advisory committee under the chairmanship of Tyler Bastian, Maryland State Archaeologist, determined that the conjectured forge was not threatened by the proposed U.S. 15 alignment and need not be excavated at this time. Information gathered on the conjectured forge in the 1977 report indicated the presence of a relatively late forge with water power supplied by the Auburn Dam through a water wheel located in the existing niche in the dam stone wall.

Documentary evidence, kindly supplied by Mrs. Marie Burns, research historian of the Catoctin Furnace Historical Society, came from the map of a transit survey made of a portion of Dr. Wm. S. McPherson's Auburn Tract property (opposite the Auburn Manor) for Mr. Fitzhugh, owner of the Catoctin Furnace. The purpose of the survey was in "reserving the forge, dam and race with water rights" (Frederick Co. Courthouse, LIBER BGF 3 F312, 1858). The map indicated surveyed points on the "dam bank", the "Old Forge", a "raceway", "springhouse and spring".

Tests indicated archaeological features containing foundry and/or forge materials including sponge iron, sprues and gates, and fragments of hollow ware (Orr and Orr 1977). The 1979 excavation under the direction of Dr. Alex Townsend unearthed the stone foundation of structures, a lot more foundry/forge materials, and and a 2 1/2' wide stone lined trough that suggested a raceway. Edward Heite, project industrial archaeologist consultant, thought these remains could indicate a multi-purpose forge-foundry area powered by undershot water wheels. Further excavation was suggested to explore this complex and potentially valuable site before it was covered by the U.S. 15 north-bound alignment roadbed.

Meanwhile the excavations of Team C (Orr) of Check 17 raceway proceeded from the north into the Auburn Dam. Trenches 6 and 7 (see Check 17 section this report) revealed a raceway system which preceeded the building of the Auburn Dam. The raceway with retaining wall proceeded in the direction of Townsend's stone foundation (Feat.1). It was separated from the later dam construction by a dark organic soil zone interpreted as a humus layer indicating a time-gap between the raceway and the dam.

## Water Power

### Historical Data

Tax assessment records and deeds have provided a fairly complete picture of the physical plant at Catoctin Furnace (Little and Israel, 1971, pp. 39-43). However, there is no mention of hydraulics systems property or equipment in most of these records, it being taken for granted that until the advent of steam power, the presence of a furnace inferred mill ponds, raceways and the like. (Bining, 1979, p.66, etc.) Insurance records of 1849 indicated that additional insurance on the furnace structure in 1853 specifically mentioned a bellows house and the machinery therein, as if new work on such implements of the industry had been done (Nat. Heritage Corp. 1975, p.12). Such improvements might have been in anticipation of the building of Stack #2 in 1856 since it was located next to Stack #1 and undoubtedly used the same water wheel. The use of steam is prominently mentioned in the manuscript census of 1960, manufactures (Schedule 5) which listed: a steam driven foundry, a smithy for making mining tools, a wheelright for wagon repairs, a saw mill, a steam driven flour mill, a post and rail operation. Three horses were used at the foundry, 15 at the flour mill and 80 for charcoaling at the "Furnace". Steam is also listed relative to the "Furnace" (Nat. Heritage Corp. 1975, p.14). Steam probably always remained auxiliary to water power for Stacks 1 and 2 - - even Stack 3 (1873) was listed as a "steam and water operated, hot blast anthracite coke furnace" (Little and Israel, 1975, p.36).

In 1858 a survey for the purposes of securing water rights was carried out in the "Old Forge" area just east of Auburn Manor (See above Check 3). At this time the Auburn Dam and its raceway system was apparently in operation and of importance. The Issace Bond map of Frederick County (c. 1858) which defines 6,600 acres of furnace lands as well as the company's railroad track connecting the upper ore bank (Fitzhugh-Kunkel mine at Check 16), also indicates the "old Forge" as an important area.

It seems clear that water power was used extensively for the entire extent of the iron-working industry with the exception of the period from 1903 when the furnaces shut down to 1911 when iron ore was no longer mined there.

### Collaboration on Historical-Archaeological Research.

William G. Renner, Historican of the Catoctin Furnace Historical Society, has recently up-dated his Map of the Catoctin Furnace Site (Renner, 1925) to include three raceway systems (Renner, 1981). He has kindly made the new data available to me for this report, and we recently revisited the furnace site in an attempt to integrate the new information in an overall synthesis of the site.

Among this data is historical information previously unknown to me concerning the Auburn Tract: "this works (Blacksmith Shop and Charcoal Foundry" located at the Old Forge, Check 3) was established about 1755-1760 by William and Sarah Brice on a 300 acre tract. And was sold to Baker Johnson, Nov. 16, 1772 for 1326 pounds. It is now the Auburn Manor estate (300 acres)" (Renner, 1981). Renner claims that the deed to this sale was in a record kept at the Frederick County Courthouse and labeled WR2, Folio P, 1772. It was seen by Renner in the summer of 1935 when he worked with W.L. Walker, a Frederick City Engineer, on a project of identifying the deed boundaries of the Catoctin Furnace Iron Industry property. It is not known where the records are now to be found.

I was also privileged to collaborate with G. Eugene Anderson, former President of the Catoctin Furnace Historical Society, in the fall of 1979. Anderson pointed out a raceway ditch extending for over 100 feet just east of the Check 12, Feature 6, Catoctin Charcoal Road site. Oral history, he said, indicated that the ditch had been used to convey surplus water around the furnaces. This diversionary raceway was obviously late since eye-witnesses had given him the information. As seen below this jig-saw piece of information fitted well into the interpretive picture of the site's hydraulic systems.

#### Archaeological Data (Fig. 1, 2, 3)

The following data was collated from the Orr and Orr reports of water power features excavated and observed in 1975, 1977, and in the present report.

Table 1 . Data on the Hydraulic Systems  
at the Catoctin Furnace Site  
(Measurements in Feet)

System	Location	Elevation	Size	Description
A-1	573+50,E750	490 <sup>a</sup>	300x200x5	Dam #1, Little Hunting Creek
A-2	568+50,E400	484 <sup>a</sup>		Raceway under Monocacy R.R.
A-3	553+30,E362	456 <sup>a</sup>		Ditto
A-4	550E362	450 <sup>a</sup>	20x2	N. end, deep U raceway
A-5	547+60,E150	448 <sup>a</sup>	20x2	S. end, ditto
A-6	542+90,E10	443.48	20x2	Ck.17,Tr.1,F1,Raceway
A-7	542+15,E15	442.47	20x2	Ck.17,Tr.4,F1,Raceway
A-8	540+70,E17	441.58	10x1.5	Ck.17,Tr.6,F1,Raceway
A-9	540+50,E50	435.96	10x1.5	Ck.17,Tr.7,F1,Raceway
A-10	539+75,E25	435.75	2x1	Ck.3,F8, Stone Trough in forge/foundry

<sup>a</sup>Observed but not excavated. Elevations from 2' contours of Md. Dept. of Nat. Resources Map of Catoctin Furnace Site, 4/16/78. An average of 2 feet was subtracted from observed map contour reading for a given raceway position.

Table 1 . (Continued)

System	Location	Elevation	Size	Description
B-1	586+50,W475	534 <sup>a</sup>	300x150x3	Dam #2, Little Hunting Creek
B-2	577+10,E90	514	5x2	Ck.12,F5,base of raceway
B-3	574+50,E190	513.5	20x2	Deep raceway,W of Manor
B-4	570+95	513	Pipe	Wooden Pipe, Stack 1 Wheel
B-5	570+95,E130	490 <sup>a</sup>		Conj. underground race 200', <sup>b</sup>
B-6	563+75,E150	483 <sup>a</sup>	15x2	Raceway, S.of Big Ore Mine
B-7	562,E175	482 <sup>a</sup>	15x2	Raceway, Saw Mill Wheel
B-8	561+30,E250	466 <sup>a</sup>	Filled in	Raceway under Monocacy R.R.
B-9	553+30,E362	456 <sup>a</sup>		Same as A3 above
B-10	550,E362	450 <sup>a</sup>	20x2	Same as A4 above
B-11	547+60,E150	448 <sup>a</sup>	20x2	Same as A-5 above
B-12	542+15,E15	442.67	10x2.5	Ck.17,Tr.4,F2 raceway
B-13	540+70,E17	442.08	3x1.5	Ck.17,Tr.6,F2 raceway
B-14	539+75,E15	435.75	2x1	Same as A10 above
C-1	581+50,W210	522	200x150x3	Dam #3, Little Hunting Creek
C-2	581,W210	520.5 <sup>a</sup>	6x3	Old Headrace to Racepond
C-3	579+45,W50	512.94		Ck.11,Tr.1, Racepond muck
C-4	577+25,W100	520		Ck.11,Tr.9, Racepond edge
C-5	578+50,W50	520	200x125x16	Race Pond surface
C-6	577+40	520	17x2	Ck.12,F5, Raceway high level
C-7	574+50,E190	518	20x2	Raceway, Same as B-3
C-8-15	See above			Same as B4-11
C-16	545+95,E55	448.67	13x4"	Ck.17,Tr.3,Raceway Basin
C-17	545+32,E25	448.35	12x6"	Ck.17, Tr.2,Raceway Basin
C-18	542+90,E10	446	20x0	Ck.17,Tr.1,F2 water eroded raceway basin at Auburn Dam
C-19	540+60,E155	c.447		Auburn Dam niche, flume of water wheel to conj. forge
C-20		445.3 <sup>d</sup>	300x125x13 <sup>c</sup>	Auburn Dam
D-1	571,E120	517	10x2	N. end of Diversionary Raceway
D-2	569+25,E150	515	10x2	Middle section of Diversionary Raceway

<sup>b</sup>Little and Israel, 1971, p.50.

<sup>c</sup>Average to base of fill or transported sediment from from GOW borings (Fauth, Appendix A Maps) plus average from surface to high water mark of the dam and pond.

<sup>d</sup>Average present surface of dam.

Hydraulic System A. System A is shown as originating in Dam #1 some 600 feet southeast of the furnace area. The Dam (Table , A-1) is seen today as a widened portion of the stream terminating in a low waterfall. Renner reported that a raceway containing water in its ditch was present in the earlier part of the 20th century and he had seen it many times, but it was filled in. Conversely, the raceway ditch was followed by the sweep of the Monocacy Railway bed, but was clearly distinguishable as sweeping to the southwest and the railroad swept to the southeast (see Fig. ). It is dramatically obvious in the 200 feet or so of deep "U"-shaped trench that occurs before the site of the conjectured original Stack 1 (A-4, A-5). At the south end of this channel, our interpretation indicates, the swift and relatively deep raceway powered an undershot wheel providing the blast air for the furnace - there being no appropriate overcast cliff for an overshot wheel between the elevation of the raceway and that of the conjectured casting house strata noted by Renner as few feet under the surface of the ground. The lowest profiles of a raceway (Feature 1) in Check 17, Trenches 1, 4, 6, along with Feature 1 of Trench 7 comprise the units of System A. It is believed that the water raced into the stone trough of Feature 8, site 18 FR 320 (Check 3), designated as A-10, which we believe powered multipurpose machines in the forge/foundry.

The average grade of the raceway between A4 and A5, conj. Stack 1 original location and A9, raceway under the Auburn Dam, and A10 stone trough is seventeen degrees (Fig. ). This relatively sharp drop, (15 degrees for rest of System A) would have necessarily enhanced the kinetic energy of the racewater flowing swiftly through the stone trough (Feature 8) to propel several, small undershot wheels (as illustrated in Lanik, 1974 ) and for turning the somewhat larger furnace blast bellows wheel.

Hydraulic System B. System B was built to power Stack #1 in its new location 3/4th miles north of the original furnace which was powered by System A. Dam #2, the mill pond of this system, was visited by William Renner, who discovered it, and myself in 1977. We knew it was related somehow to an earlier system than represented by the racepond. But it wasn't until the evidence of the 1979 dig was in that we realized where it fit. The barrage of stone and earth which originally crossed the Little Hunting Creek (B-1, Fig. ) had long since been cut through. But the sides of the extensive dam front still were plainly visible. The raceway was also clearly marked running southwest toward the furnace. The deep double raceway Check 12 Feature 5 could now be explained. The bottom, small raceway carried water from Dam #2 to the only stack at Catoctin Furnace at that time - Stack #1. At this time the racepond and its earlier open mine of the area didn't exist. A deep, wide, and obviously old raceway ditch just west of the manor carried the water to the area of the stack. Oral tradition had it that a wooden pipe carried the water under the charcoal road which flanks Stack #1 on the north. Today one sees an iron valve at the end of an iron pipe and set in a stone faced pit which extends to the niche in the retaining wall.

Little and Isreal show the raceway crossing the open space of the furnace area underground for several hundred feet where it surfaces south of the Big Ore Pond (1971 fold away map). Renner says oral history agrees with this. A flagstone covered stone lined trough extended under the casting house floor of Stack #2 (Feature 5, drain, Orr and Orr, 1975). The drain preceded the casting house strata. This drain, however, was interpreted as a device to carry away the excessive heat of the casting houses. Further investigation will be required in connection with future excavations involving Stack #1. The System B raceway continues past the Big Ore Pond and swings sharply east at the conjectured location of the saw mill (B-7). According to Renner it then goes over a fall to the level of the Monocacy Railroad track. The raceway is then seen going south across the Renner entry road where it joins the large "U"-shaped section leading to the conjectured site of original Stack #1. Two pre-Auburn Dam raceway profiles are interpreted as belonging to System B (B-12, B-13). These are features placed stratigraphically later than the System A raceways which also occur in the two trenches. The end use of System B raceway water was to power machines in the Old Forge/foundry area just south of Auburn Dam, and preceding it in time.

Dam #2 racewater drops over 20 feet in approximately 900 feet to the raceway Check 12, Feature 5 (base). The direct grade of 25% is suggested, but the raceway path may meander. Further work is needed to trace the path of System B raceways which were outside of the right of way excavation limits. The grade of the rest of the system resembles that of System A (c. 17%) with the exception of the grade from Check 12, Feature 5 (base) raceway to the conjectured Stack #1 flume level (B2-B4), the grade estimate being gentle at c. 5% which one would expect for a raceway carrying water to an overshot wheel. In this case the kinetic energy released in its drop with the wheel was more importance than the velocity of the water, as in the case of the undershot wheels.

Hydraulic System C. The shift from System B to System C depended on a number of events: the digging of iron mines in the Check 11 area which led to a water-filled hole serving as a washer pond and finally to a water-storage area, the racepond. These activities were bound to be disrupting to the System B raceway. Wooden troughs could have handled some of this. Indeed, Renner reports such a trough between the iron ore mine Check 12, Feature 2 and the unexcavated Check 12, Feature 3 mine. However, when the racepond became a reality dam #3 the millpond of the system came into existence. The main factor appeared to be the building of Stack #2, next to Stack #1. Stack #2 with nearly 3 times the iron-producing capacity (annual capacity 3,300 tons of pig iron) of Stack #1 would require a proportionate amount of additional water. Stack #2 was built in 1856, however, by 1858 a survey "reserving the forge, dam and race with water rights" was carried out for Mr. Fitzhugh on the property of Dr. Wm. S. McPherson at the "Old Forge" area of the Auburn Tract. So, at this time water was also needed for the Auburn Dam. And this was supplied by Hydraulic System C.

In view of these events in the middle of the 19th century an assured supply of water was needed. The answer to this need was the building of the racepond(C-5, Table 1 ) to provide a constant source of water. System C used the same raceway (Check 12 Feature 5) as did System B before it. The difference was that because of the increase in water by the building of the racepond the raceway had more water to convey and was hence built up. Figure 23 shows this difference as the second mound is fully 7 feet higher than the first. The clay lining of the channels show the lower channel an inverted trapizoidal figure measuring 7.5x2.5' on the parallel sides and 2.5' in depth. Since trapizoidal area is found by multiplying one-half of the sum of the parallel side by the distance between them - System B's channel has an area of 23.42 feet. The top of the System C trapizoidal channel as marked by clay (and located about 1.5 feet below the 520 elevation line taken to mark the outline of the racepond hence the top high-water mark). System C's channel measures 18x2.5' for the parallel sides by 5' deep - giving an area of 135 feet. In a word: System C had a capacity of 5 times as much as System B has - which is ample, one would think, for the production of 4 times as much ore with both furnaces producing. The total capacity in cubic feet for the racepond is gained by multiplying its dimmensions 200 by 150 by its depth between the surface at 520' and the base of the raceway at 514' or 6'. The total is 180,000 cubic feet.

The raceways of System B are used by System C up to the former location of the conjectured Stack #1. At this point the wide shallow clay basins supported by layers of horizontally-laid soil and buttressed with rocks and heavy fill on the east side, with a retaining wall on the West side - carried water to a second storage area, the Auburn Dam (C16-18). The high retaining wall in the area of the Spring-Bathhouse is part of this complex. We note that the grade of the clay basin is relatively flat measuring about 4 degrees. This type of raceway , shallow and wide (12'x6") and with a low grade seems ideal for conveying quantities of water to a storage area without stirring up mud and clay. The water of System C is finally used on the conjectured water wheel that fit in the niche of the Auburn Dam. Oral tradition and some excavation in 1977 indicated that the wheel (perhaps 25' in diameter powered the (new) forge the ruins of which were obvious until covered by the Emmitsberg-Frederick road fill (slag) in the early 1900's (Orr and Orr, 1977, p.9, et. seq.) Allowing 3 feet from the niche to the water surface we calculate the water available at maximum for the overshot wheel of the conjectured forge to be 300x125x3 or 37,560 cubic feet.

Hydraulic System C, Diversionary Raceway. Eugene Anderson called my attention to a north-south ditch between the Charcoal Road site (Check 12, Feature 6) and the retaining wall of the Catoctin Furnace area. The ditch was 4 feet deep and 12 feet wide and extended for over 100 feet in the direction of the raceway south of the Big Ore Pond. He said old timers had told him the ditch was used to carry overflow (surplus) water not used in the furnaces.

Recent construction (U.S. 15, 1960) had interrupted the southern course of the raceway to join System C east of the Bid Ore Pond. The recent appearance of the ditch cut and the fact that the memory of the raceway here was still fresh in the minds of the old timers indicated a late date for this feature. We know that water for Stack 3 (1873) was gotten by reviving the raceway ditches from Dam #1 just to the east of the furnace (Renner saw this ditch full of water in the early 20th century and old timers advised him of this use). We may also presume that as more machinery came under steam power there was less need for water in the quantities demanded by the water wheels. We may interpret therefore as follows: sometime toward the latter part of the 18th century the demand for water slackened in the furnace area to the extent that quantities of it were by-passed around the area in a diversionary raceway. Renner also noted that when Stack #3 was built it's engine room produced enough hot blast steam that sufficient could be piped to Stack 1 and 2 directly. This suggests that about this time water from the racepond was shipped around the furnace in the diversionary raceway to end up in the tail-race of the Auburn Dam after servicing steam and water-wheel machinery along the route.

The Deer Lakes. Lanceolot Jacques's owner of Catoctin Furnace land in the 1920's attempted a land development scheme inspired, some say, by the Florida land development of the same period. A deer park with William Renner as custodian, was set up around lakes made with the racepond water, and the nearby dug-out iron ore mine (Check 12, Feature 3). The features connected with this post-furnace effort are discussed in the section on Check 11, Racepond above.

The Goldfish Pond and the Trout Pond. The water power system C was put to two further uses in the post-furnace period. In the 1920's the demand for goldfish, largely to stock aquariums in 5 and 10 cent stores, led to the development of fishponds some of which still exist to the present time. The racepond was used for such a purpose and William Renner, fresh from his custodianship in the deer park, tended the fish. A Secretary of the Interior under Pres. Herbert Hoover became interested in the area, and Hoover, who enjoyed fly-casting fished the nearby Little Hunting Creek. Renner sold a supply of his goldfish for the White House ponds.

President Franklin Delano Roosevelt also visited the area which soon became his famous "Sha-gree-la" hid away. The story was current that the racepond with its goldfish would be drained and the goldfish removed. The water was replaced (through raceway from Dam #2) and a platform built along side the pool now refilled and stocked with brook trout from a nearby fishery. FDR would then be wheeled out to fly fish for trout. After this the platform was removed, the pond drained and the trout remaining would be returned to their fishery, and the goldfish returned when the pond was again filled. There is no archaeological evidence to support this gem of oral history, but if you were to stand by the remnant of the pond today it would not be long before you would be joined by a small school

of enormous goldfish. And these are the antecedents of the presidential retreat, Camp David, located a few miles away in the confines of Mt. Catoctin.

### The Furnace Fuels

#### Nature and Function of Charcoal and Anthracite Coke.

The fuel needed for the high temperature (2800 degrees F) necessary to free iron from its oxygen molecule(s) in iron ore ( $\text{FeO}$ ,  $\text{Fe}_2\text{O}_3$ , low and high grade ores) was discovered at the beginning of the Iron Age, some 4000 years ago. It was carbon in the form of charcoal made from wood. The fuel is easy to obtain and it burns readily to provide the heat necessary for the reaction, or reduction, of the ore to metal. This reaction is expressed thusly:  $\text{Fe} + \text{O} = \text{FeO}$ , iron "rusts" in the atmosphere and results in iron oxide;  $\text{FeO} + \text{C} = \text{Fe} + \text{CO}$ , iron ore heated with carbon (charcoal) results in iron and carbon monoxide gas. Man was satisfied with charcoal until the Industrial Revolution with its incessant demand for iron and steel resulted in the depletion of forests in England. Coal was a successful substitute for charcoal in making the brittle cast iron but the inevitable sulphur in coal made wrought iron crumble when struck.

Meanwhile, coke was discovered by heating coal in a reducing atmosphere, like making charcoal. This reaction drove off as gases the offending sulphur and left porous carbon. Abraham Darby, iron-master at Coalbrookdale, England, birthplace of the Industrial Revolution, first used coke to produce iron in 1709. By 1760 most furnaces in England had substituted coke for charcoal due to the prohibition of the use of charcoal in the iron industry. (Gale, 1979, pp. 2-7).

In America the use of coke in iron furnaces, while understood, was not considered necessary. There was still plenty of wood for charcoal in the wilderness forests and labor was relatively cheap. By 1840, however, coke began to be used in American furnaces. The wood supplies were being depleted in the forests of the furnace tracts. Also, the cost of labor kept rising. It took an acre of wood (840 bushels of 20-35 year old trees) for one day's firing of a blast furnace to produce 2 tons of iron. Moreover, it took up to 12 colliers full time, day and night, to tend the smoldering charcoal pile- requiring 3 to 10 days before the charcoal was completed. (Bining, 1979, pp. 60-64).

In regard to the use of charcoal at Catoctin Furnace, Mentzer notes that following Baker Johnson's death in 1811 an advertisement appeared in the Frederick Town Herald offering for sale a large blast furnace and its stack (Stack #1), wheel and bellows and other property of the furnace. Mention was made of the existence of plenty of wood and young timber sufficient to furnish wood for many years. Mentzer, a specialist in early American folkways writes "The mention of 'young

timber' for coal wood is interesting and confirms a traditional resource-use pattern. Choppers clear cut, leaving only an occasional 'seed tree' for reforestation. In about 30 to 35 years they 'come back' and the process would be repeated." (Mentzer, 1974, pp5-6)

### Fuels and the Catoctin Furnaces.

The Conjectures Stack #1. The original furnace was undoubtedly a charcoal, cold blast furnace, the blast of which was powered by an undershot water wheel. Dr. Alex Townsend, director of John Milner Associates followed up Renner's information on the conjectured location of the furnace with a small test in the spring of 1980. The strata revealed by the test is reported to be quite similar in appearance to those exposed in the excavation of the Old Forge/Foundry site (Check 3, 18 FR 320) including the presence of slag. A more extensive excavation will be needed to fully confirm this as the furnace site.

The Old Forge/Foundry Site (Check 3, 18 FR 320). The essential findings in regard to basic function of the area was established in the intensive survey (Orr and Orr, 1977, p.10-11) were supported by the findings of the 1979 excavations (John Milner Associates, Part 2 of this report). The survey revealed a thick strata of charcoal interspersed with sprues and gates, casting debris, quantities of "sponge iron" nuggets, and a few small fragments of glass slag along with fragments of furnace brick. Edward Heite industrial archaeologist consultant in 1977 as in 1979 believed the site to be a foundry: "My reasoning for the foundry is this: 1. the casting waste, in the form of vents and sprues, was abundant. 2. There was no glassy slag in the matrix to indicate the presence of primary refining (mine: very little), 3. the frothy mass of iron waste is a foam that forms in foundry sites but is almost totally absent in a blast furnace" (Ibid. p. 11). With the enlarging of the site it has become clear that other functions than that of a foundry were taking place here and the possibility of a multi-function area including a forge is now being clarified by Townsend.

Stack #1. This furnace as rebuilt in 1787 at the present furnaces location was a charcoal, cold blast, powered by an overshot wheel. It's annual capacity was 900 tons of pig iron. The original dimensions of 32x8 1/2' was enlarged in 1831 to 33x9' with an annual capacity of 1700 tons of pig iron (Little and Israel, 1971 Chronological chart from Directory 1888:32 and Lesley 1859:50). It was dismantled in 1890 (Directory 1892:30). William Renner said an old timer whose father was engineer at Stack #1 told him the name of this stack as "Whipcrack". It is unexcavated and believed to be directly north of Stack #2, sharing a wall with that stack.

Stack #2, "Isabella". The present standing stack was a charcoal furnace and steam operated. Lesley (1859:50) indicates that it was a hot blast furnace. Little and Israel (erroneously?) call it a "cold blast charcoal furnace". They then appear to contradict themselves with "The introduction of steam to provide the energy for the blast furnace required the addition of an engine house, a hot-air oven

(italics mine), and other related buildings to the Catoctin Furnace complex. The addition of a hot blast, charcoal furnace represented an advantageous technological advance.

"The use of hot blast did more than permit the adoption of anthracite fuel; it reduced fuel consumption per ton of iron significantly. Overman put the savings at 30 to 60 percent for coke and anthracity and at 20 percent for charcoal. Furthermore it shortened the time needed to reduce iron with charcoal by 50 percent. Not surprisingly then, this innovation so crucial to anthracite smelting gained quick acceptance at many charcoal furnaces. Lesley's 1859 guide to iron works indicates that atleast 271 of the 711 charcoal furnaces he listed had either warm or hot blast apparatus." (Seeley, 1981, p.47).

The excavation of the casting house in 1975 revealed that pig iron had been cast in sand floors, leaving red sand outlines of the sows and pigs cast. The clay lined trough leading from the iron notch of the hearth had conveyed molten iron to the sand molds. The molds for the pig iron, however, occupied marginal positions around an intrusive central basin in which a "wishbone"-shaped gear for hauling heavy objects by mules was found. a thick dark layer covered the remnants of the pig-iron sand molds. Also the trough leading from the iron notch at the hearth of the furnace was filled in with red sand and covered with a layer of black cinders. This situation analysed from Fig. 1 and Fig. 2 indicate a change of function during the life of the casting house. Renner reported finding quantities of casting waste including sprues and gates some 20' south of the casting house south edge against a stone wall. The indications are that the latter part of the use of the casting house was as a foundry. When the iron notch became obsolete and was filled in and covered with ash from the cinder notch out of which iron was ladled into sand molds contained in boxes.

Charcoal fragments are frequent in the sand layers. Over the sand layers and interspersed with them are found layers of grey cinders. The black cinders overlay the entire area close to the hearth. This is interpreted as indicating a change in fuel types used. Perhaps Stack #2 originally a charcoal fuel furnace, used coke for the casting of pig iron and use anthracite coal for the casting of hollow ware. The hot blast equipment of this stack would have allowed such versatility. It was furthermore logical to use coke for the pig iron whose wrought-iron qualities were most important. Anthracite coal would be inexpensive and suited to melting iron to be used for cast iron. (Orr and Orr, 1975, Figs 1,2,3).

Stack #2 was built in 1856 measured 33x9' and had an annual capacity of 3300 tons of pig iron. It was practically dismantled in 1893. (Little and Israel, 1971, Chronological Chart)

Stack #3, "Deborah". This furness, constructed in 1873, was the giant of the Catoctin Furnace complex. Its annual capacity was increased from 9000 ton to 15000 tons of pig iron - 3 times that of the other two furnaces together. It was a steam and water operated, hot blast, anthracite coke furnace encompassing the latest improvements in furnace technology. An archaeological investigation of the engine house took place in January 1976 as a concomitant to the digging of cleat holes in support of the retaining wall directly to the east of the engine house site. Six cleat holes, roughly 5 foot square and 10 feet apart and 1 to 3 feet in depth comprised the dig. The excavation revealed a series of stone-faced pits surmounted by rotted timbers secured on numerous upright iron stakes. It is believed that the engines produced compressed hot air to be piped into the 50x11 1/2 and later 60x13 feet cylindrical stack adjacent to the engine house. Among other beneficial things the hot blast ignited the coke to a temperature high enough to melt the iron ore. The dig revealed a series of parallel rectangular engine service pits. The engines had been removed along with most of the machinery of Stack #3 to Everett, Pa. according to William Renner. The engines had rested on a 4 course brick floor which, along with massive 12x12" timbers acted as buffers to the massive machinery.

The floor area layer, a mixed clay fill, contained building debris of bricks, shattered window glass and broken roof timbers as well as construction nails of late cut and drawn types agreeing with the recorded date of the furnace in the latter part of the 19th century. Other finds included a large pig iron plate, fragments of iron tools. No furnace tailings were found since the loading of the bosh was accomplished by a steam powered elevator which rose as a square tower next to the stack. A talus of limestone occupied the corner of the retaining wall nearby. This limestone, undoubtedly used as flux was probably shoveled down from the large, wooden stockhouse which occupied the adjacent cliff edge of the retaining wall (Little and Israel, 1971, Plate 3B). A mound, some 75 feet in diameter and a few feet high, located directly to the north of the engine house was all that remained on the surface of the plant. Excavation will, undoubtedly, uncover the foundations of the stack and hoist, and other buldings as well as the exciting strata of the casting house. Massive grey-green slag of waxey texture (6" and more in thickness) found as fill on the side of the Charcoal Road (Check 12, Feature 6) and the conjectured buried forge (Check 3, Test 1,2 Orr and Orr, 1977, p.9) are said to have come from Stack #3. The Stack #3 slag contrasts sharply with the small, glassy, multi-colored slag of the charcoal furnaces. (Orr and Orr, 1976).

The Sale of Iron and Charcoal. The following are rare glimpses of the sale and distribution of Catoctin's main products:

According to the "in" correspondence in the papers of the Lobdell Car Wheel Works, no Catoctin iron was being offered for sale in 1840, but by 1848 Baltimore commission merchants such as Henry Thompson expected in January to receive soft pig..

...First in blast'. In junw of the same year Thompson had received 'Catoctin #1 Foundry charcoal', and Sticking & Beatty were offering 'Catoctin strong charcoal iron'. on January 3, 1855, #1 and #2 Catoctin Charcoal Foundry iron 'used by machinists and others of this City' were offered by Roger and Wetherill." (Nat. Heritage Corp., 1975, p. 12)

### The Charcoal Road.

Having established the nature of the furnace fuels, and their uses in stacks and foundrys, let us now turn our attention to the manner in which charcoal was harvested and gotten into the stacks.

Little and Israel noted that the Old Charcoal Road (known today as the Catoctin Furnace Road) was probably so named in the 19th century because it served as the main feeder road for all logging roads on the south side of Catoctin Mountain and descended the mountain to an elevation equal to the height of Stack #1 (Little and Israel, 1971, p.47). They searched for the Old Charcoal Road with a limited number of backhoe trenches that were notable in that they appeared to miss most of the features on the plateau to the west of the retaining wall. They concluded "The Old Charcoal Road was farther to the north than indicated on Figure 2 and was destroyed in part or totally by the construction of the ca. 1960 Catoctin Furnace Road" (Little and Israel, 1971, p.55). For some reason, their hypothesis as to the location of the Old Charcoal Road was never tested since all the tests are to the south of the conjectured road.

William Renner, our historian, had learned from the old timers that the Old Charcoal Road came in from the west, from the mountains, at the southeast "corner" of the intersection of U.S. 15 with the Catoctin Furnace Road - directly to the south and paralleling that road. In fact, the two roads do not coincide until some 1500 west of the cross-section. A series of logging or charcoal trails are seen stringing up the mountain to the south of the Old Charcoal road about 500 feet west of the cross-section. These data can be seen in the areal photograph (fig. 4). U.S. 15 when built in 1960 cut across the road which at that point was a land bridge between the shallow mine Check 12, Fig. 3 on the north, and the deep mine Check 12, Feature 4 on the south. A spur of this bridge still survives today, and it is here that our excavation of the Charcoal Road began.

The trenches and borings of the 1979 archaeological investigations proved that the plateau to the west of the furnaces and supported by the castle-like stone retaining wall was a massive wedge built to serve as a charging bridge. The terminus of the Charcoal Road was the large 2 story stockhouse at the edge of the retaining wall. Here the charcoal was stored, along with other necessities, until needed in the stacks. The earthen wedge actually encompassed the rear of Stack #1, but Stack #2 was separated by some 20 feet necessitating a small wooden bridge. Both stacks had small gabled houses directly

west of the stack edge and to service the stacks and stone chimney houses directly over the boshes (Little and Israel, 1971, plate 1B). As mentioned above Stack #3 had its own elevator tower for loading. Boring #28 shows the plateau to consist of fill, furnace tailings and clay-silt. to a minimum depth of 8.3 feet (Fauth, Appendix A, p.46). The profiles of Check 17, Feature 6, Charcoal Road dig show a variety of clays and silts making up the bulk of the fill, but with massive piles of slag to support the edges of the plateau (Fig. 28-32). These soils resembled ore washings and must certainly have come from the mine areas. The plateau is flanked by the shallow mines (Check 12, Features 1 and 2) on the northwest and by the deep mine (Check 12, Feature 4) on the southwest.

The plateau at this point consists of an upper terrace to the north and a lower terrace some 7 feet below to the south. There are two roads marked by horizontal bands of charcoal dust and containing ruts 5 feet apart on each of the terraces. In addition, on the upper terrace a gravel road with similar ruts but lacking charcoal was found. The roads are 10 to 15 feet wide. The upper terrace road flows in the direction of the land bridge mentioned above. But the lower terrace roads are terminated by the ravine of the deep mine Check 12, Feature 4. We interpret these data to mean that the lower terrace roads were used before the deep mine was dug, and the upper terrace roads were used subsequently. The gravel road was in use until 1960 when the present Catoclin Furnace Road, a feeder road to U.S. 15 was constructed. Two kinds of slag flank the north edge of the plateau. The first, a small, glassy, slag of blue and green color is associated with the charcoal furnaces acted as an edge of shoulder to one of the charcoal roads. The second type of slag, a large, grey, dull silica material similar to that found in the fill under Route 806 and over the conjectured forge at Check 3, is associated with Stack #3 waste. It supported the gravel road. (Figs. 28-31)

William Renner, Catoclin Furnace Historian says that when he was a young man in the 1920's the older men well remembered the charcoal Road. Wagons would arrive at the entrance to the furnace plateau and the collier would pull a bell attached to a large sycamore tree located about in the middle of U.S. 15 at present. The Charcoal Weigher would appear and weigh the charcoal to record what was owed to the collier. The wagon would then proceed to the stockhouse and the bottom board of the wagon removed, so that the charcoal would be eased to the ground where it could be handled. Charcoal wagons were also specially constructed in that they were narrow at the bottom and wide at the top. "The loads thus carried from hearth to furnace depended upon the size of the teams and number of mules employed were from two to four hundred bushels to the load" (Flower, 1975, p.17). Lesley (1859:50) listed the horses used at Catoclin as follows: "Three horses were used at the foundry, 15 at the flour mill and 80 for charcoaling at the 'furnace'" (Nat. Heritage Corp. 1975, p.14.)

If we assume that 70 horses would be available to work on an average and that 2 horses were assigned to a wagon, we determine that the capacity for hauling charcoal was 35 wagons a day with an average of 300 bushels per wagon or 10,500 bushels of charcoal per day. In 1859 both charcoal stacks would be available with a total capacity of 5000 tons a year. Two million bushels of Charcoal would be necessary. Ofcourse, the stacks would not be in blast all year round. In fact the capacity of the wagons to haul charcoal would be limited to 190.4 days (10500 divided into 2 million). We must remember however, that Stack #2 was hot blast and realized a 20% saving on fuel or 264,000 bushels, adding 23 days to the charcoal hauling capacity (264,00 divided by 10500). By this devious means we come up with a figure of 213.4 days in blast for the two furnaces per year. The suggestion is seen in these data that the Catoctin furnaces were in blast 2/3rds of the year or rather that the transportation facilities were geared to serve the furnaces for 2/3rds of a year. It is not that such hypothetical facts are so important in themselves but that they might be used to compare with other figures relating to other problems involved in reconstructing the manufacturing of iron at Catoctin. In lieu of plant records this is perhaps the only way to get at certain facts.

### Mines and Quarries

#### The Mines

Mining in the 18th century was a simple thing. A few miners with simple digging tools and carts could readily supply the needs of the furnaces from iron ore deposits at or near the surface. Thus the German traveler Johann Schoepf wrote "Any knowledge of mining is superfluous here, where there is neither shaft nor gallery to be driven, all work being at the surface, or in great, wide trenches or pits" These trenches were rarely more than 40 feet deep. When this depth was reached, new "mine holes" were opened up: (Schoepf Travels, II, 7 in Bining, 1979, p.58.) Mining at Catoctin never got beyond the open pit or quarrying kind since the iron ore consisted of ferrous oxides deposited from solutions on contact with alkali waters (due to proximity of limestone) near the numerous springs running off the extensive slope of Catoctin Mountain (see Fauth, Appendix A for details on the geology of the iron mine). What did change in the over 140 years of mining here was the locale of the mines due to the constant search for ore veins, the depth of the mines, and the sophistication of the getting the ore out, washed and transported to the stacks.

The Auburn Mine: Check 18 (Median 543-545+) is located 600 feet west of the Auburn House. The only informant on the Auburn ore mine who could say anything about it said he had never heard of anyone who knew anything about the mine "Nobody known anything about the mine - making it very old", he said. Singewald, 1911 (p.199) gives an interesting description of the mine: "There is an old opening one-half mile south of the surface back of Dr. McPherson's house. It is 500' by 200' and strikes North 20 degrees East. In the center of the opening is a large mass that was not removed. The overlying soil has worked down so that only a portion

of the east side (of the mass?) is exposed, showing a ledge of limestone." He continues "...The bank back of Dr. McPherson's house (Auburn House) was opened in 1774 by James Johnson and Co. and the ore smelted in a furnace erected on the property. (Ibid p.201). Bastian, 1973 (p.4) notes that the Blue Mountain mine (Fitzhugh-Kunkel mine) and the one near Auburn are shown on the 1873 map, but the Catoctin Furnace Railroad is shown connecting with only the Blue Mt. Mine (Luke 1873, p.37). The mine is beginning to emerge further as an indispensable source of ore for the "South iron-working complex" consisting of the early forge/foundry site of Check 3, the raceway finds of Check 17 (under the Auburn Dam) and the conjectural location of Stake #1. (Orr and Orr, 1977, p.81)

#### Check 12, Features 1,2,3; Check 11, Sub-Racepond; Shallow Mines:

These shallow mines, described in detail by this report and Fauth Appendix A are believed to be the source of iron ore referred to by Alexander in describing where the new furnace was erected in 1787 "about three-fourths of a mile further up Little Hunting Creek and nearer the ore banks" (Alexander 1840, p.78). The mines were not noticed by Singewald in his geological survey of 1911 - meaning that they were probably obscured by age at that time. These interconnected mines represent a constant search along iron ore veins. The iron deposits were probably approached and removed as described by Fauth (Fauth, Appendix A, pp. 27-46).

The ore in these mines were probably exhausted before the building of Stack #2 in 1856 since the racepond with its greatly increased water power was needed for Stack #2 and it covered one of the shallow mines. We can visualize this period as one of urgency for the securing of new sources of iron ore. Two sources appeared and were exploited simultaneously: the deep mines to the west and south of the furnace (Check 12, Feature 4 and the Big Ore Bank at Check 13; and the fabulous Fitzhugh-Kunkel mine 1 mile north of the furnace area.

#### Check 12, Feature 4 and The Big Ore Bank at Check 13:

These mines, both of which were observed by Singewald, probably started as shallow mines and were extended below the water table as steam pumping equipment came into use. Feature 4 is covered by U.S. 15 but a profile made before the construction of the present U.S. 15 showed its deepness which was confirmed by borings in the 1979 project. (Appendix A, p.36, fig. 11). Two rails 6-8' in length were found in the depression of this iron mine. William Renner has a photo taken by his father in 1885 of the Big Ore Bank. (Little and Israel, 1971, Plate 4A). The camera was facing the deep mine from uphill and showed 6 bunker areas each with a slot in the middle about 3 feet across through which the ore was shoveled into ore carts pulled by mules over wide-gauge rails on wooden ties. A gang of 8 or so workers are above the slots and appear to be shoveling ore nuggets, some as big as the workers heads into the carts.

Mr. Sandy, Superintendent of Cunningham Falls State Park, recovered one such cart from the muck of the pond now covering the mine. It had iron wheels made by the Lobdell Car Wheel Co. and dating 1871-72 (Fig. 5 ). Our excavation in 1979 recovered a similar frame minus the wheels (Check 15). Sandy reported also discovering iron tracks and wooden ties ascending an incline plane to the south out of the pit. Our investigations failed to find the rails due to high water, but discovered evidence of a railroad up an additional incline plane continuing to the south by a pond (Fig. 41 ). Oral tradition recognized this as the ore washer of the mine. The ramp had been built up of ore washings from water applied from the water reservoir from springs (Orr and Orr, 1977, Check 15). The bed of the railroad returned north to Stack #3 with the cleaned ore passing over a bridge over the raceway of System B and C described above.

The Big Ore Bank shut down in 1903 bringing iron production finally to an end at Catoclin. William Renner got the true story of the shut-down from Harry Fraley when he (Frayley) was in his eighty's in 1940. Frayley worked in the big pit as a boy. The story was that George Holt, the night pumper stopped the pumps "on a Sunday evening". the two steam pumps were vital to keep the ground water down. The pit just filled up. The other mine workers were behind this move. They stopped work because of the companies poor finances. "They were disgusted with their low pay". Everyone seemed to realize that it was too expensive to import expensive coke used in Stack #3. The charcoal which was so cheap and abundant on Catoclin Mountain could no longer be used.\* The pit was above 90 feet deep on the up-hill side, and 37 feet deep on the east side. It had two levels, the bottom and a terrace about half-way up (see Fig. 42 ). The ore was moved in carts and this equipment and the rails were still in the water and muck covered pit. The workers left their picks and shovels, ore carts and other tools - "everything was left down there"

Check 16, Fitzhugh-Kunkel Ore Bank. Check 16 is located at the Fitzhugh-Kunkel ore bank situated 1 mile north of the furnace area. This mine also called the Blue Mountain Mine (after 1900) was probably opened in 1857 or shortly before and provided ore for Stack #1 and the recently constructed Stack #2. The ore was hauled to the Catoclin Furnace area by ore railroad. The enormous banks measured about 2300 feet north-south by 300-800 feet east-west with a depth varying from 25 to 60 feet from east to west sides. It was in operation continuously until the closing of the furnaces in 1903 and then continued to supply ore for export to Pennsylvania furnaces until 1912 (Bastian, 1973, p. 4 et seq.)

The 1979 excavation at the entrance of the mine was inconclusive due to damage to the archaeological remains in the course of building the road and culvert of U.S. 15 in 1960. It is suggested that answers to the same problems of transport routes in and out of the mine could be secured in future excavations in undisturbed strata west of the

\*The primary purpose of the Monocacy Valley R.R. built about 1886 was to haul coke to Stack #3. At that time it was a steam line 4 miles long, running from Catoclin Furnace to Mchanicstown (Thurmont).

### The Quarries

Frederick Formation (Cambrian) limestone one of the important rock units in the vicinity of the Catoctin Furnace project area (Fauth, Appendix A, pp. 10-11) has provided many quarries in the general vicinity. The limestone from these quarries has been of prime importance to the development of this portion of Frederick County - in providing building materials through the quarried rock and slacked lime for fertilizer, paint and the like through the limestone kiln which abound in the vicinity. The limestone had a vital importance to the iron industry at Catoctin Furnace in 2 ways: (1) in Fauth's words "In general, it seems justifiable to say that the base of the Frederick formation is probably the principal control on the localization and distribution of the iron deposits" (*Ibid*, p.54) and (2) The well-known use of limestone as a flux for cleansing iron of undesirable mineral associates in the ore. Quantities of limestone (Singewald tells us 800 pounds of limestone are needed to produce one ton of iron, Singewald, 1911) as heated together with the iron and the minerals are in the form of slag. It is significant to note that John B. Kunkel, ironmaster at Catoctin Furnace 1856 to his death at 1885, took out a patent on an improvement in processes of eliminating phosphorus from iron (Nat. Heritage Corp, 1975, p.45). The presence of phosphorus in iron ore resulted in inferior pig iron in which the phosphorus, practically inseparable from iron by use of the usual limestone flux, would cause the iron to have a tendency to "cold shortness" (brittleness). Kunkle had noted the great affinity exhibited by phosphorus for magnesium and his "invention" was the use of dolomite or magnesium limestone instead of the ordinary limestone-calcite ( $\text{CaCO}_3$ ) to be replaced by  $\text{Ca, MgCO}_3$  2.

Check 9, Limestone Quarry. In our analysis of this small quarry just south of the iron mine and washer ramp complex (Checks 13, 15) we concluded that the limestone had been tested and found wanting, probably as a flux, and the project was aborted. Fauth presents his analysis of the limestone from Check 9 quarry (Appendix A, p18. He analyzes it, interestingly enough, as a low grade and imperfect dolomite. Could this test have been made after 1876 when Kunkel's paper requesting a patent had been published but before his death in 1885? The archaeological evidence would fit well with such an interpretation in which the inventive ironmaster Kunkel perhaps enthusiastically searched for dolomite on the furnace lands only to be disappointed by the poor grade and perhaps "marginal" performance of the flux.

The "Limestone/Ore Pits". Little and Israel three pit areas to the south and southwest of the stacks as "Limestone/ore Pits". (1971, Fig.2 foldout map). The idea was conjectured since no excavation was attempted, but it was a logical one. The limestone and the ore were there together might they not have been mined together?

One of the conjectured pits turned out to be the Big Ore Bank Pond, the other was a shall reservoir of spring water used on the washer ramp, and third was which may well turn out to be a limestone quarry. The third depression is Check 21 in our study a massive depressed area measuring 400 by 100 by 25' deep at its deepest point up against the cliff on which the saw mill and the grist mill are reported to have been situated, and over which the raceway waters poured probably to power the water wheel of those mills (Hydraulic system B and C). Check 21 is exactly 600 feet from its northern edge to Stack #1. This fits the measurements of the "lost" limestone quarry described in the 1811 public sale notice of Catoctin Furnace - among the other properties of the furnace was included a "limestone quarry not more than 200 yards from the furnace bank. While Little and Israel thought this was the limestone/ore pit to the southwest (our Check 13), Mentzer thought it might be directly east of the stacks and covered with slag (Mentzer, 1974, p.4).

Can we say that the same mines did not yield first iron ore and then limestone on the Frederick formation base? Our only excavating experience has been in shallow mines where the ore veins have been well above the bedrock (Check 12, Features 1 and 2). However, we do know that the miners worked in this area probably did go to bed rock from 20 of fill is below the water base of the pond. However, the bed rock here is not limestone but quartzites and phyllites (Fauth, Appendix A, p. 18 et seq). The bedrock of Feature 2 of Check 12, a shallow mine consists of two types Harpers formation quartzites and Phyllites in the west section and dolomite of the Frederick formation in the east area. The bedrock of Check 12, Feature 4 is also of the Harper formation. These data would preclude the Little-Israel hypothesis of the necessary juxtaposition (superposition) of iron ore on limestone although this situation seemed true on the eastern edge of the mountain.

Check 19, limestone Quarry. This quarry was geometrically cut as if it had supplied building blocks. The neatness contrasted sharply with the mauled appearance of the limestone in the aborted quarry (Check 9). Limestone may have been used from this quarry to build the stacks, or retaining wall, but probably not as flux since it also had imperfections in its chemical makeup. also no cultural material was found in this dig (see comparisons of chemical analysis of 4 specimen from this site, and 3 specimen from the talus behind Stack 3 at the furnace in Orr and Orr, 1977, Dave Martin SHA Bureau of Soil and Foundations, Appendix A, Orr and Orr, 1977)

### Shaft Mining.

There is both tangible and oral history evidence that toward the end of the Catoctin Furnace, when iron ore was being sold from the Kunkel mine, there was considerable prospecting for ore on the mountain. The son of a miner, in his sixties, gave the following

oral history account:

"My daddy worked at the ore bank and he used to do a lot of exploring for iron. He would dig a hole 6 feet or so around and went down 50 feet or so in search of the ore. The shaft was shorn-up with chestnut wood cribbing which was very strong. But the soil was sandy and wet and the sides of the shaft would give in (slump) forming a big fan. When the dirt was taken up at the depth of 50 feet the space at the bottom was big enough to drive a team around."

A similar shaft was excavated near Check #9, limestone quarry.

Check #8 (Median 555+62), "The Silver Mine": No one disagrees with the identification of the feature of Check #8 as a "mine shaft". The controversy starts when someone claims it is a silver mine shaft. Interviewee B, an old timer in his early eighties, is one of the strongest advocates of the silver mine theory. He claims he got the true story of the mine shaft from the man who operated it. Silver Joe we will call him, in case some of his descendant's are still around and might take umbrage at some of the things attributed to him. Silver Joe told the Old Timer that he operated the mine from about 1867 for a period of 15 or 20 years. He worked a windlass drum which raised the silver ore and lowered miners into the shaft. Mules did the job and there was a stable of mules a hundred feet or so east of the limestone quarry road.

Silver Joe explained that the shaft extended for a dozen feet or so and then fanned out like a funnel to a depth of 65 feet. Here a circular base "big enough to drive two teams of horses around as the silver mine. The silver was in the form of a vein of metal a half-inch thick. The mine prospered over the years until one day when the mine owner fired the mining engineer and tried to run the mine himself. This proved unfortunate for the silver vein was lost in the process. The story goes that before this tragedy rocks bearing the silver vein were brought to the surface and the metal extracted on the spot. It was then sent to the mint in Philadelphia. I saw the hole in the ground - about 8 feet in diameter with an additional pit around it having a diameter of some 20 feet. The ground was littered with small pieces of limestone.

A son and grandson of miners, in his seventies, told me he had heard about the silver mine and felt along with others that there was something to it. But "it didn't amount to much". He remembered a curious story told about the shaft. It seemed that a Catoctin Furnace resident got mad at his neighbor's pigs for eating his corn. The owner of the pigs appeared indifferent to his plight. One day the offended one lured the pig herd one by one to the shaft and unceremoniously booted them in, until the whole herd was at the bottom of the mine. For years the disappearance of the pig herd was a mystery. One day the culprit whose conscience

had been bothering him all those years confessed his deed, then left the community after paying for the pigs.

Another resident in his late 60's, who came from a long line of miners smiled knowingly when I inquired about the silver mine story. He believed that indeed "they had found something there and then pulled it out. But no one seen that silver". He was also well acquainted with the pig disappearance story. He chuckled and remarked that "the Devil helped get the pigs in!" On the subject of Silver Joe he said, "He wasn't noted for his honesty and on this occasion (the silver mine incident) he may have been stretching a little bit. I remember Joe when I was a small boy. He was a nare-do-well who would drive around in his mule wagon followed by a gang of boys chanting an indecent rhyme about joe's digestive system (which doesn't bear repeating since it rhymes with joe's real name). But he would take such teasing in a good natured way. Joe was a great talker with a good sense of humor. He loved a joke and he was always talking"

Jonathan Hager's Silver Mine. A second silver mine story is curiously interwoven with the first one. Information on this was supplied by SHA geologists who were asked to investigate the silver mine rumor since the shaft mine was on the U.S. 15 right of way. Their account is given in an SHA communication (Martin and Bittendorf, 1971). They turned up a newspaper account dated Hagerstown, Maryland, Sept. 29 (1927?) which reported that the secret silver mine of Jonathan Hager's, operated by him with the help of blindfolded slaves from 1750 to 1776, had been found on Catoctin Mountain. The story was credited to the owner of "6500 acres including a large part of Catoctin Mountain, Lanceolot Jacques". Jacques allegedly claimed that one of his workers had stumbled on the mine which contained "nearly pure silver" in rocks at its entrance. The worker was part of a mineralogical surveying team looking for iron ore at the request of a New York mining company. There was no follow up on the story. The worker who allegedly reported the silver mine was none other than the Old Timer who started me off on the tale.

The SHA Investigation. In carrying out their assignment the two geologists evaluated the newspaper account of the Jonathan Hager's secret silver mine and found it wanting. Hager's biography made no mention of silver and the fact that there was no following up on a promising news article cast doubt on the veracity of the story. In addition they put down a core-drilling machine and secured a core from the area at the edge of the mine shaft to a distance of 40 feet below the surface. Limestone was encountered from 2 to 7 feet and below this was typical stratigraphy of the area with no suggestion of a funnel. They concluded that "the silver mine was largely mythical" (idem). At my request the SHA investigators took samples from the quarry at Check #9 and compared it with the core samples. The limestone of the two samples was identical.

Archaeological investigation of the "silver mine". The mine shaft was excavated to a depth of 10 feet with a backhoe. The objects found were typical of those in any junk pile of the last 25 years or so. The mound to the south of the pit was bisected to reveal a 2 foot lens of limestone chips and spauls intermixed with soil and distributed over an area of 30 feet in diameter. The data indicated that Check 8 and 9 were concerned with the same limestone strata. It seemed probable that the shaft preceeded the quarry operation and was a test which led into the operation. Since a quantity of limestone must have been gathered, it can be assumed that the limestone was actually tested in a bosh, possible Stack #2 during an actual blast. (Orr and Orr, 1977, pp 40-43).

The Laboratory. Quite late in my research (January, 1982) when I was passing the location of Stack #1 with William Renner he pointed to a small mound behind the casting house of Stack #2 and said "that was the laboratory where iron would be tested. They had lots of glass test tubes and materials in jars. At the time I saw it Jacques was developing the place and ordered that the place be cleaned out. He threw away a wealth of information". I thought even so this would make a good dig for the future with a chance perhaps to find some test materials that had been broken and discarded nearby throughout the use of the lab shack.

#### Catoctin Village

Having brought together the key systems of the industrial culture at Catoctin - the furnaces, hydraulic power, fuels, and mines and quarries - we are now in a position to attempt to integrate these data with such information on the people of the mining community as we have on hand to begin to understand the dynamics of Catoctin Village in an ethnohistorical analysis. To do this conveniently and to begin atleast to impart a sense of development and direction to these cultural data we have divided the time period involved into four periods as follows:

Early Period, pre 1776-1787, the Formative Period.

Early Middle Period, 1787-1856, the Developmental Period.

LateMiddle Period, 1856-1890, the Flourescent Period.

Late Period, 1890-1911, the Disintegrative Period.

#### The Early Period, Pre-1776 to 1786.

A 1770 patent, called "The Mountain Tract" and totalling 1715 acres was issued to Benedict Calvert and Thomas Johnson"for the purpose of erecting and building an iron works" more land, including "Good Will" and "Stoney Park" were added in 1776 (Nat. Heritage Corp. 1975, p.4). James Johnson and Co., iron producers, was subsequently

formed consisting of James, Thomas, Baker and Roger Johnson of the wealthy land-speculating family. In his letter to the Council of Safety which was requesting war supplies from the Johnson iron works he said "my brother is getting his furnace into blast with all diligence and I hope to effect it within a fortnight". This strongly indicated that the Johnson stack was not on the Good Will tract and not in its present position. Alexander's information (1840:78) given above can bear emphasis namely that the first furnace was built in 1774 by the James Johnson Company and carried on successfully until 1787 when the same company erected the present furnace about 3/4th mile further up Little Hunting Creek and nearer. Renner claims to have seen the deed in which Baker Johnson bought the land on which the first stack was built from William and Sarah Brice in 1772 (see above) and which became the Auburn Tract.

The archaeological evidence indicates that the first stack ("Conjectured Stack #1") got its ore from the Auburn mine some 800 feet to the southwest and that the blast was powered by an undershot wheel through raceways of Hydraulic Power System A. Hollow ware and perhaps shells were probably cast at the Old Forge/ Foundry located also about 800 feet to the south. The Johnsons probably didn't live in the area at the time for Auburn Manor wasn't built yet. The sizeable stone cottage located some 600 feet south of the manor was referred to in oral history as the iron master's house (Renner). In Col. Baker Johnson's will of 1811 it is called the "overseer's house" (Little and Israel, 1971 p.22). In 1788 Thomas Johnson purchased more real estate for the furnace and four negro slaves suggesting that the furnace was well established and producing among other things stoves (Nat. Heritage Corp., 1975, p.6).

#### The Early Middle Period, 1787-1856.

This entire period was dominated by a single furnace - Stack #1, Whipcrack. In the rebuilding of 1787, when Whipcrack was moved stone by stone from its original position to its present position, the stack's annual capacity was raised from 600 to 900 tons. In 1831 it was enlarged, one foot higher and one-half inch wider to 33x9', the capacity was changed to 1000 tons of forge and foundry metal in 30 weeks time (Lesley 1859:50; Swank 1884: 253 and Directory 1888:32. The period was one of technological challenge from new furnace competition, panic and depression (1937) and the post 1840 period of development and expansion in the iron industry.

In the early part of the period Baker Johnson emerged as the dominant ironmaster of the Johnson brothers by first acquiring 2/3rds to Thomas's 1/3rd interest in the furnace, and finally he bought out his brother to become sole owner in 1803. He resurveyed his holdings into the Auburn Tract on which a manor, which stand to this day was erected (ca. 1802-1806). Then, apparently surfeited with these efforts he leased the furnace to Blackford and Thornburry

for 10 years. Baker died in 1811 and on July 13, 1811 the following were offered for sale in the Frederick Town Herald and valued at \$12,500: two tracts of land, including one meadow; a large blast furnace and its stack; wheel and bellows; a large two story stone dwelling house, with necessary outhouses attached to it, and a fountain pump at the kitchen door; two convenient store houses; a chopping mill; a stonemith shop; barns; stables; corn house; and fifteen to twenty houses for the accommodation of workmen, all in good order. The advertisement also mentioned the existence of plenty of wood and young timber sufficient to furnish coal wood for many years and that the ore bank immediately on the spot was inexhaustible. Mention was also made of a limestone quarry not more than 200 yards from the furnace bank. (Little and Israel, 1971, p.40).

During the ownership of Willoughby and Mayberry (1811-1820) and John Brien(1820-1843) the operations of the furnace were beset with financial problems. These culminated in the depression following the Panic of 1837). The furnace complex was sold again in 1841, The Republican Citizen, December 24th described the complex as: Two tracts of land; stone and log ironworkers' dwelling houses; a superior dwelling house; other farm houses; a large garden and store; carriage house; ice house; merchant mill (grist mill); saw mill; and numerous subsidiary buildings. Due to the hard times the stack was apparently not saleable.

Things began to pick up during the ownershp of Peregrine Fitzhugh (1843) and when in 1856 Fitzhugh shared half ownership with John B. Kunkel the agreement description list showed a marked degree of modernization: One tract of land, 6 teams of horses and mules; wagons; harnesses; coal (on hand); 14 cords of wood (on hand); ore mine; Furnace Stack #1; railroad cars; furnace tools; blacksmith and carpenter tools, wagons, carts and farming tools, and ore bank mules. Following are the archaeological data which pertain to the Early Middle Period:

Auburn Manor - Built 1802-04, still occupied today.  
Springhouse, Check 4, Feature 1, lower level - probably built same time as Manor. Served Manor in preserving foods becomes bathhouse with spring in Late Middle Period.  
Old Forge/Foundry, Check 3 (site 18fr320)- unknown termination date but not after 1858.  
Auburn Dam, Check 3 Feature 3, Starts probably c. 1856 but not after 1858, used to end of furnace operations.  
Conjectured Forge, Check 3, Test 1, coeval with Auburn Dam  
Hydraulic System A - is replaced by Hydraulic System B about 1837  
Hydraulic System B - begins about 1837 to power Stack #1 in new location.  
Stack #1 in new location (present location) - 1837.  
Shallow Mines, Check 12, Feature 1,2 - known of before but used after 1837 for Stack #1 iron ore  
Slave Cemetery, Check 6 - probably started in Early Period and abandoned in 1940's

Shallow Mine under racepond, Check 11, probably after 1837 but before 1856.

Conjectured Limestone Quarry, Check 21, Depressed Area, 200 yards south of Stack #1.

Carty (Miner) House, Check 7, probably built in early 19th C. and it was used until the 1920's.

Two house sites West of Furnace on Old Charcoal Road, probably built in Shallow Mine period after 1837, abandoned in late 19 C (ruins filled with debris of that period).

Charcoal Road, on Lower Terrace, Started c. 1837 for loading Stack #1, abandoned after Deep Mine, Check 12, Feature 4. (1850s?)

Iron-Master's House, 2 story stone Manor House at Furnace, built c. after 1787 and before 1811 (where it appears in 1811 sale)

Baker's will of 1811 is valuable in revealing some aspects of his seventy-two slaves. A study of this document and other papers as led to an interesting study of the possible background of the slaves buried in Check 6 (MAAR, Gallagher "Historic Documentation Report," 11 pages, Appendix I Archaeological Data Recovery at Catoctin Furnace Cemetery, January, 1981) The physical anthropology report of the same dig, an analysis sex, age, race, size-build and pathology from 35 burials shows a marked lack of white admixture among the black traits. Dr. Angel of the Smithsonian Institution concluded on seeing these skeletons that "they could well be immigrants from Africa (Ibid, Mid-Atlantic Archaeological Research, Inc. 1981, Appendix 2.) The iron-master, Mr. Brien suggested the Moravians try a short-lived program of preaching in English at a schoolhouse near the furnace very other Sunday, particularly "for the sake of the negroes who had no other opportunity to hear the gospel. An Episcopal chapel was erected in 1834 for the white community with ministration for the negroes. (Nat. Heritage Corp. 1975, p.9). Heite while noting that the burials in coffins mainly in shrouds suggest christianization the lack of segregation by sex precludes the burials to be under the auspices of the Moravian church (Edward Heite, "Comments of Historical Consultant", Ibid, Appendix 8).

#### Late Middle Period, 1856-1890.

This was the period of greatest fluorescence of Catoctin Village combining as it did large productivity of iron products from 3 blast stacks with an annual capacity of nearly 15,000 tons with capable management under the direction of John B. Kunkel, Frederick lawyer, state senator and iron-master extraordinary.

In 1856 Fitzhugh constructed a steam-operated charcoal furnace Stack #2 (Isabella) along the side of Stack #1 (Whipcrack). The same year he sold his interest to Kunkel who became sole owner. The conveyance between the two on the transaction is given above.

Kunkel then apparently de-emphasized the hollow-ware furnace(#1) and concentrated on Stack #3, a steam and water operated hot-blast, anthracite-coke furnace. The shift from pig-iron production to foundry casting as seen in the archaeological excavation of the casting house of Stack #2 was undoubtedly another of his innovations. Kunkel's patent for the elimination of phosphorus from pig iron by the use of magnesium limestone flux is another instance of his aggressive role as iron-master (see above). The activities of the furnace were economically successful and Catoctin Village made an impressive impact in the county (Little and Israel, 1971, p. 26). In 1866 the forest lands were increased to 11,000 acres to provide additional needed charcoal for the stacks. In 1880 all three furnaces were operating. Scharf (1882) lists: 300 woodshoppers and coal makers employed; 100 miners extracting brown hematite ore from the ore bank 1 mile north (Fitzhugh-Kunkel mine, Check 16) and transporting it by a private railroad to the furnaces where 100 men worked around the clock. Little and Israel estimate a grand total of some 500 men. The 1976 tax assessment valued 10,000 acres of forest land at \$30,000; with improvements valued at \$40,000 listed as follows: a dwelling house, 3 furnaces, warehouse and shops, store houses, and 50 iron workers houses. 2 steam engines valued at \$3000 and 30 ore carts valued at \$300 was also listed. (L & I, 1975, p. 27)

Archaeological data associated with this period follows:

Fitzhugh-Kunkel Mine, Check 16.  
Railroad from mine to Stacks 1 and 2.  
Monocacy Valley Railroad - bringing coke to Stack #3.  
Auburn Manor.  
Catoctin Furnace Manor.  
Bathhouse, Check 4, Upper Levels.  
Hydraulic System C.  
Carty House, Check 7.  
Mining Shaft, Check 8 and Limestone Quarry, Check 9.  
Big Ore Bank, Check 13.  
Washer Ramp and Pond with mine railroad, Check 15.  
2 workers homes, Check 20  
Stacks 1, 2, 3  
Casting House of Stack #2

Ten workers houses are to be seen today on the old Frederick-Emmitsburg road (Md. 806). Oral history also mentions other houses, standing and disappeared that the workers occupied opposite the Auburn Manor on the same road. Our research has been concerned with 3 workers houses. The yard of the Carty House, Check 7 was excavated by our project (Mid-Atlantic Archaeological Research team, IV, Orr and Orr, 1982, Part 3). This house was built prior to the slag plateau build up behind the retaining wall at the furnace. It may have been one of several subsequently removed by U.S. 15 excavations or covered by the plateau fill. The other two were part of a reported 6 workers houses on the Old Charcoal Road above the shallow mines (Check 12, Feature 1).

### The Late Period, 1890-1912.

This is the period of disintegration of the iron industry at Catoctin Village. one after another the furnaces fell into disuse: Stake #1 in 1890, Stack #2 in 1893, and the giant Stack #3 in 1903. The coup de grace in 1903 at the Big Ore Bank just south of Stack #3, as seen in oral history, is reported above in the synthesis on mines and quarries.

Following Kunkel's death in 1885 a series of companies tried to continue in the iron producing business for a few years with marked lack of success. The Catoctin Iron Company (1885) was run by Kunkel family members; Catoctin Mountain Iron Company (1887); The furnaces were idle from 1892 to 1899; the Blue Mountain Iron and Steel Co. (1899); and J.E. Thropp who primarily sold ore from the Fitzhugh-Kunkle mine and who dismantled Stack 3 for shipment to his furnace in Everett, Pa. These rather cannibalistic activities was a signal for the local citizens to join in the dismembering process. (1905-1912)

The Fitzhugh-Kunkle mine is of prime important in this period. Our brief dig at the entrance of the mine indicated, however, that the archaeological features in the right of way (our area of mitigation interest) had been badly mauled by the construction of the road and the large culvert at this point (MAAR Check 16, Orr and Orr, 1982, Part 3).

The answer to the question of why the furnaces died is that due to competition from the steel industry iron became obsolete as a prime material for making things. Pig iron is still made as the basic material for making steel. But the modern furnace (open hearth primarily) with its specializations and intricacies is superior to the blast furnace and there is no arguing with that.

### Post Furnace Period.

From 1923 to 1937 the site was owner by E.A. Nicodemus, Lanceolot Jacques, and Mr. Hauver. During their time an attempt was made by Jacques to promote interest in a land development project. The racepond and part of the adjoining raceway were used to make a Deer Park lake. The remains had to be identified in order to distinguish them from those of the furnace periods. But they have an interest of their own in providing background for the important presidential hide-away Camp David.

In 1937 the National Park Service took over the area and initiated the first research into both the historical and archaeological aspects of the site. In 1954 the site was turned over to the Maryland Park System to become part of Cunningham Falls State Park.

## Future Archaeological Excavation and Research.

Following are some favorite areas of mine for archaeological research and excavation in the future:

*Culture*

An Oral History Project

Excavations to establish the settlement pattern and common cultural patterns of Catoctin Village

Laboratory research to establish chemical and other interpretations of iron-industry waste e.g. to reconstruct temperatures and flux compositions from slag, etc.

Excavation of Stack #3 foundation and that of out buildings.

Continued detailed excavation of raceways.

Increased use of archaeological data in relationship to historical data.

## Addendum

### The Hydraulic Systems.

On completion of the hydraulic systems study above it became clear that an unexplained gap in the continuity of systems A and B raceways from the Conjectured Stack #1 location to Trench 1 of Check #17 existed. This stretch of raceway was interpreted, incompletely it appears, as having been constructed simply for System C, the latest of the water power systems. On reexamining the lower strata of the water system in Figures 47 and 48 we note the presence of horizontal clay and sand strata that could only have been deposited by water flow. We also note the presence of a deliberately cut in channel, which would not have been necessary simply to construct buttressing for the wide clay basin of system C (Layers 2 in both trenches). It is not clear that the stretch of raceway of Check 17 prior to the dam contained superimposed one on the other the three systems. The superposition of System B on System A channel is shown in Trench 1, 4 and 6 beneath and preceeding the construction of the Auburn Dam. Trench 7 shows only System A. Since System B raceway is not superimposed on that of System A in Trench 6 we assume that it had a different destination than the stone trough of Feature 8 in the feature of Check #3.

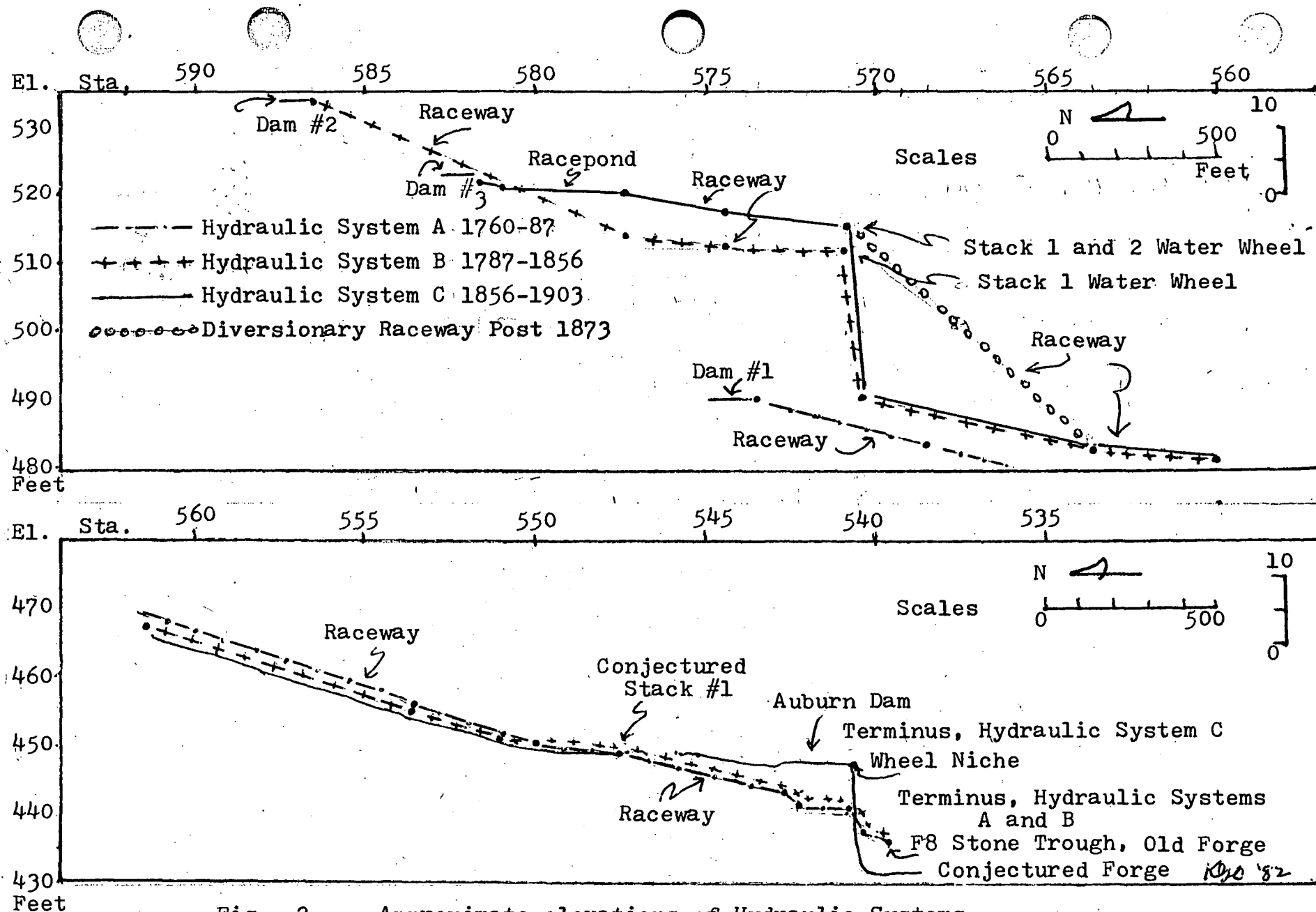


Fig. 2 . Approximate elevations of Hydraulic Systems powering Catoctin Furnace pre-1774 to 1903.

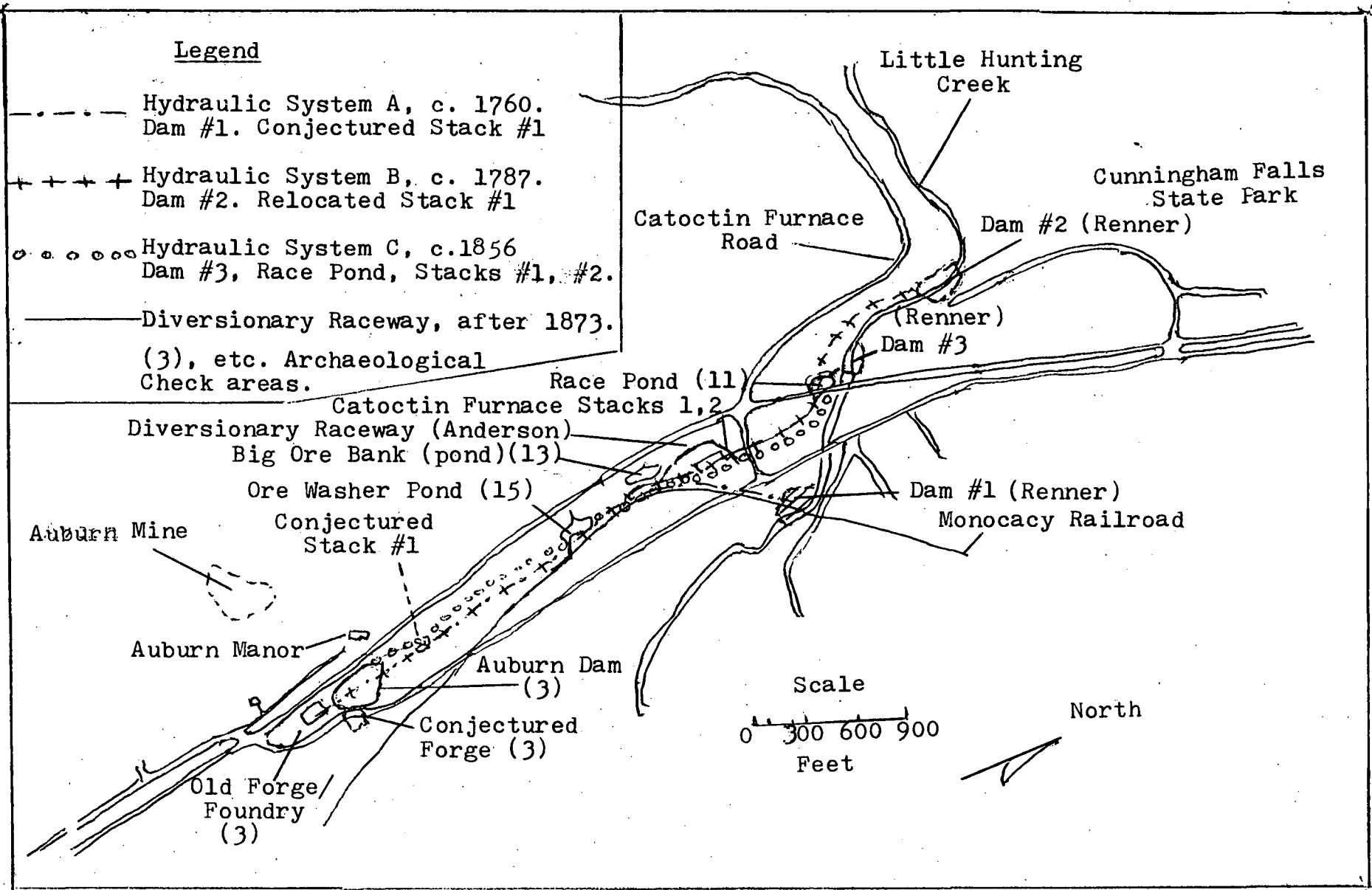


Fig. 3 . A Reconstruction of the Catoctin Furnace Hydraulic Power Systems.  
(Base Map after "Base Map" Nat. Heritage Corp., 1975)

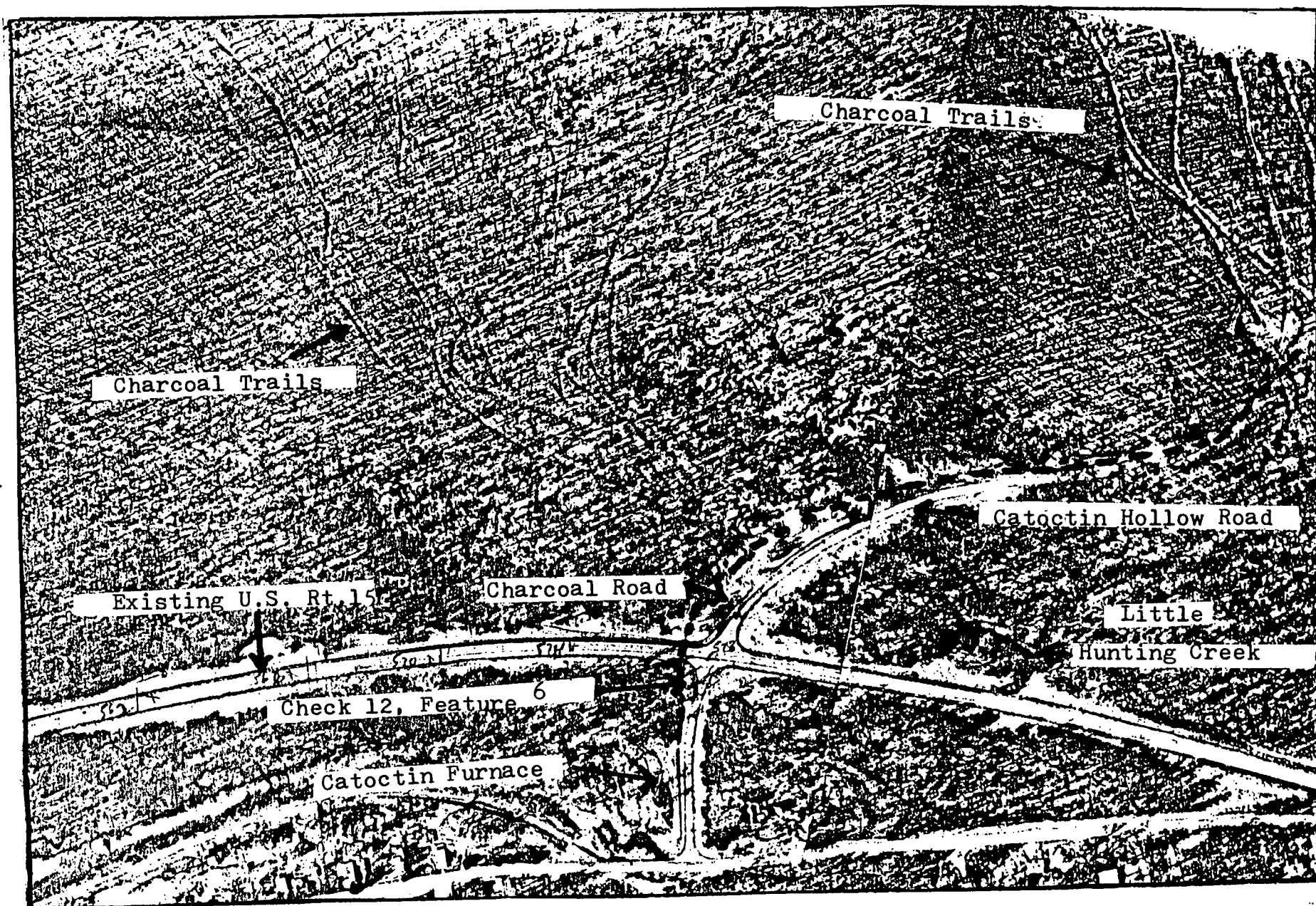


Fig. 4 . Aerial Photograph of Catoctin Furnace Area showing Charcoal Trails and Charcoal Road (Photo 02/28/73, F15-044-045, AMT2400)

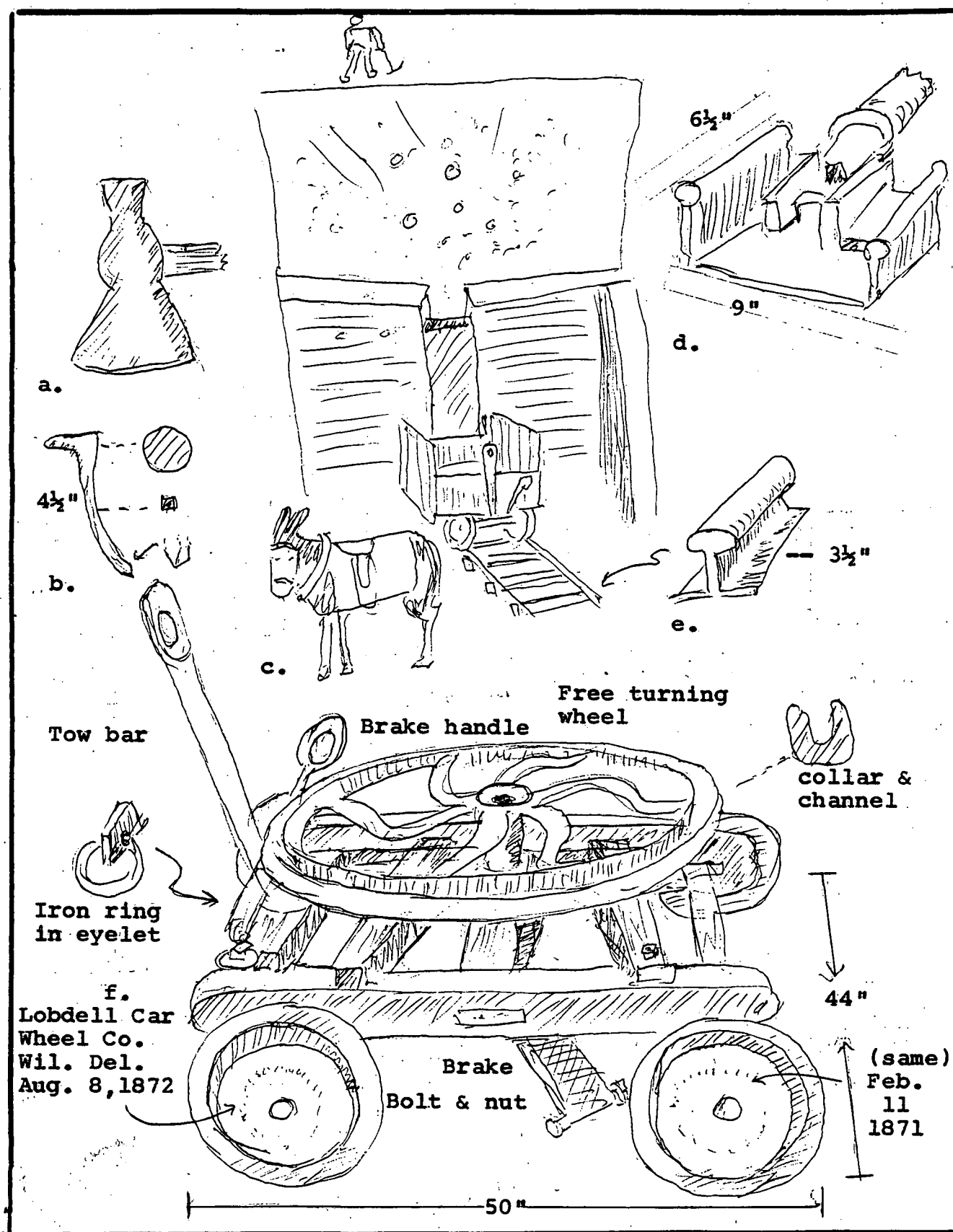


Fig. 5 . Late Middle Catoctin Furnace artifact complex. a. Hatchet, b. R.R. spike. c. Mine bunker from Renner photo. d. possible switch. e. Ore R.R. iron rail. f. Ore R.R. cart. (a,b, Check 15, Others Sandy exploration 1969; e, both)

CHECK 4. BATH AND SPRING HOUSE  
(18FR321)

Research Design

The Check 4 area research design underwent some changes as the result of excavations and the recommendations of the Advisory Panel of the project. The original plan to salvage the stones of Feature 1, the Bathhouse, for possible reconstruction was abandoned due to the quantity and complexity of the remains. In its place a plan to "monitorize" the feature when the highway had been constructed was substituted. This consisted of carefully excavating, measuring and recording the remains, and to later install instruments to observe the effect of the road on the ruin in regard to vibration, compaction, torque-stress, chemical changes and the like. (Orr et al, July 1979, pp. 19-23; Appendix E).

As the raceway feature which was originally part of the Check 4 complex increased in size and complexity, it was seen desirable to extend Check 17 as a linear zone to the perimeter of Check 3, iron-working site to the South. Also, as a result of excavation and oral history studies, the Spring site (Feature 2) was recognized as a recent feature constructed by the Tresselt family to assist in their goldfish hatchery in the 1920's.

The Bathhouse site (Feature 1) was discovered to have an early level at which time it was a springhouse. Additional time and effort had to be allocated to accomodate this turn of events. On the other hand, the search for pathways to and from the feature proved less rewarding than expected, with the exception of the area directly around the bathhouse. Interior drainage problems both faced by the original builders and the excavators proved more complex and pressing than visualized since the site was situated on a spring. Finally, quantities of ceramic artifacts, also not anticipated but very welcome, were found associated with the site features. (Fig. 6)

Feature 1, Spring-Bathhouse

Exterior of Feature 1, Spring-Bathhouse.

Four test trenches were placed at the corners of the feature. (Trenches 1-1A, 2-2A, 5-5A, Testpit 6-Trench 6; Fig. 7).

The trenches were dug to the subsoil, perpendicular to the walls, then expanded to explore up to half the entire length of each wall. In addition, two pathway trenches were dug (Trench 6-6A, Trench 3), exposing the area immediately in front of the doorway, and in a likely area 8 feet east of the southeast corner. Here a pathway, bowl-shaped and 4 foot wide, was discovered leading in a southerly direction. The pressing time factor and overburden of stones and debris in the general area did not allow for further excavation of pathways.

Oral history notes that slave women heated water in a large kettle for the baths of the women of Auburn House and the Iron Master's cottage. This common understanding got some support with the discovery of charcoal fragments near the front door and behind the opposite wall. Here an iron pipe with screwed-on elbow joint was found. Oral history suggests that this pipe was part of a ram jet pump which sent water from the spring up to the Auburn House and also that the same pipe brought water down for the bathing from the raceway directly to the west. The pipe, non-committally, was found extending to the raceway stone wall - which also pointed in the direction of the Auburn House. No well-defined builder's trench was found along the grid West wall. Here the foundation stones had been laid up against the subsoil loosely. The grid South wall had a more pronounced band of discolored soil, indicating a wide cut outward into the subsoil in laying the foundation stones and door step. In the grid North wallbuilder's trench large stones and mixed clay fill had been dumped in an effort to divert the stream of spring water located at subsoil level.

The cultural material from the builder's trenches included 29 redware sherds. These and the other redware sherds found in the 1979 excavations were identified by Ms. Betty Cosans, project ceramist, as local wares. The Makley family of Thurmont operated a redware pottery kiln in the 2nd half of the 19th century. The kiln, located in the present-day "Crow's Nest" camping area near where U.S. 15 crosses Maryland route 77 according to members of the family visited by our team, supplied local needs for the greater part of the 19th century. Location of the kiln site and its excavation would be an important task for the future. Four blue transfer print decorated sherds (19th century, pre-1860), and 3 blue-shell-edged sherds, both groups being pearlware were found. The shell edged sherds may be of the late 18th century but predate 1840. One shell-edged pearlware sherd was dated by Ms. Cosans as 1820-40 in the later phase of that style. (Noel-Hume, 1970, pp. 129-133). Other finds from the builder's trenches included several dozen cut nails of various sizes and a few wrought iron ones, brick fragments, and an iron casting of a sprue or gate, by-product of a casting mold, a curved piece of thick iron of unknown use, and numerous small grey and shiny slag fragments. These and other similar materials found in the north, south, and east wall trenches appeared to indicate a time period from the early to the middle of the 19th century. (See Tables 5, 6 and 9).

### Interior of Feature 1, Spring-Bathhouse.

After clearing away the overburden of humus, wall stones, and wall plaster, flagstones were revealed forming a floor. The flagstones one to two feet wide and two to three feet long were extraordinarily thick (5-6 inches) and weighed from 50 to 130 pounds each. A two-foot square metal basin occupied the southeast corner of the floor to a depth of 29 inches below the floor level (Feature 1B). The basin was filled with water and functioned as a catchment basin being fed by a channel which funneled spring water from an iron-grated square hole in the west wall. A similar opening also grated with pointed iron "teeth" was opposite the basin allowing egress for the constant supply of spring water. (See horizontal overview Fig. 7, and wall profiles Figs. 17 and 18).

Wooden boards were seen on the western edge of this basin extending underneath the flagstone floor (Feature 1W). In order to explore this lower level the floor stones along the north and west walls were taken up in a two-three foot wide L-shaped trench. A foot-thick layer of dark soil mixed with numerous brick fragments and bats, as well as glass fragments and sherds, intervened between the two levels. At the bottom of this dark fill was a thin, sandy silt layer ( $\frac{1}{4}$  to  $\frac{1}{2}$  inch thick) covering 1 inch-thick wooden boards. The boards were partly deteriorated. They were one foot wide and were lined up two abreast running parallel to the north and west walls. Evidence that these were trough boards was found in four corners of Feature 1. Here several vertical wooden edges 2-4 inches high indicated their function in channeling the spring water which continually flowed from the ground. A test pit in the interior of the floor showed that the trough boards did not extend over the entire floor but hugged the edges. This test pit revealed a sandy layer several inches thick located a foot below the flagstone floor and a light scattering of brick fragments. This pointed to the possible presence of a coursed brick floor at the wooden trough level -- the first floor for the springhouse. Underlying the sandy zone was a thin layer of slag similar to that found in the builder's trenches. In the test opposite the front door bricks were found which had been put in, on second thought, over a non-functioning wooden trough board.

In the process of removing sections of the stone floor, a 10 to 12 foot long double tiered two-abreast row of bricks was found in the underlying clay layer (Feature 1S). It stretched, in a Y-shape from the middle of the west wall diagonally to the metal catch-basin in the northeast corner of Feature 1. The Y-opening was adjacent to the opening with the iron "teeth" noted above. A square metal pipe  $\frac{1}{2}$ -1 inch thick was discovered at the top of the catch-basin (Feature 1A; Fig. 17). This pipe, over 2 feet long, exited through the stone wall into an outside piled-stone drain that ran underground toward the stream located 10-15 feet north of Feature 1 (Feature 1R, stone drain). This appeared to be an elaborate drainage system to channel water outside of the springhouse. (See Fig. 8)

Oral history has identified a large bathtub (wooden, plaster or both) said to have occupied the southwest corner. A pipe hole was found beneath the stone floor and near by, paralleling the west wall below the flagstone floor but above the wooden trough was an iron pipe 4 inches in diameter and 4+ feet long. The pipe end coincided with the entrance of the brick drain and could possibly have acted as a drain for water either originating at the spring or somehow flowing out of the bath tub.\* Ladies from the Auburn Mansion and perhaps elsewhere, according to oral history bathed here only in the summer. There was certainly no evidence of interior heating. It is easy to surmise that they partook of light refreshments as suggested by four ornate cut glass sherds found on the bathhouse floor along with cup and saucer sherds (Table 3)

#### Feature 2. Tresselt's Spring Excavation (Fig. 6 )

A spring consisting of a concrete box measuring 5 x 4 feet by 3 1/2 feet deep located 20 feet grid North of Feature 1 was originally thought to be the source of water for Feature 1, Bathhouse (Orr and Son, Aug. 1977, p.18). This hypotheses proved useful but incorrect as Feature 1 was subsequently proven to have its own spring and Feature 2 proved to be a 20th century feature. Two excavations were undertaken. The first consisted of pumping out the concrete box spring and screening the 2 feet of sand at its base. The top foot of sand contained several dozen sherd fragments of a plastic pipe. The same pipe extended from the box through a hole toward the fish hatchery 200 feet to the east. The bottom contained an 1885 Indian head penny and a metal overall button of a 20th century type. A few pellets of slag were also found. The second excavation was a 2 foot wide trench dug in a grid east-west direction through a low mound of stones. This was thought to be possibly the broken down wall of a spring house since an area approximately a foot deep and 10 foot square had been cleared in the bedrock around the spring. The trench revealed only stone slabs 2-4 inches thick and irregular which were identical to the bed rock. The remains of a wooden frame to go over the concrete spring was found but no evidence of a springhouse structure. The interpretation of the findings were that the spring had been constructed by removing bedrock and boxing the area with concrete and the flow diverted to the (now) abandoned fish hatchery by a small stream.

Mrs. Frederick Tresselt, widow of the founder of the hatchery, later told us that her husband had constructed the spring in the 1920's as a water supply for the fish hatchery. She said that a spring had been located at the site of the hatchery building but this was filled in and another one built at the site of Feature 2. The spring continued in use with improvements being made, including the use of plastic pipe until a few years ago when it was abandoned. Winston Churchill,

she said, visited the Check 4 fish hatchery during World War 2 when he and President Franklin Delano Roosevelt were holding meetings at the "Shangrila" predecessor of Camp David. Churchill was reportedly grateful to Mr. Frederick Tresselt for supplying him with game fish (from Tresselt's traveling aquarium exhibit) for the table; he also was a goldfish hobbyist.

### Feature 3. Retaining Wall of Raceway

This feature which provides a backdrop for the site is not functionally connected to Feature 1, Spring-Bathhouse but belongs to Check 17, Raceway, and is discussed below. Chronologically, as indicated below, Feature 1 predates the raceway retaining wall.

### Conjectured Water Pipe (Feature 1C)

An oral history account related that a 6 inch water pipe led to the raceway from the Bathhouse and provided water for the baths. A second account which came directly from the nephew of a former mistress of the Auburn Manor states that when water pumps became available water was secured from the spring inside the bathhouse (see open basin Feature 1B) by means of a pipe. This arrangement was discontinued in 1915 when the manor got its own plumbing system with bathrooms provided with water more directly from wells located at the manor house. Our investigations unearthed some 5 feet of a galvanized iron with zinc coating (Fig. 6) in a trench outside of the Feature 1. The pipe aimed generally in the direction of the raceway retaining wall and Auburn Manor disappears into a talus slope. The pipe reemerges having been curved sharply upward and extending in an upward grade for an additional ten feet in the direction of the top of the retaining wall. A gap of about 8 feet intervenes between the end of this pipe and the edge of the raceway wall. The end of the pipe next to the wall of the Bathhouse has an elbow joint facing upward as if to accommodate a section of pipe that would go vertical to the wall. This is in the vicinity of a conjectured window in the grid North wall of the Feature (Fig. 18). A convenient opening also appears below the window for the same purpose. The hypothesis then visualizes the pipe continuing across the bathhouse floor to the basin of spring water mentioned above. Our interpretation favors the second oral history account and discredits the first on several counts (1) the bathhouse did not need water since there was plenty available in the open flow basin (2) a raceway is an intermittent source of water (see discussion of water power below). \*

### The Feature 1 Finds

The findings in and around Feature 1, Spring and Bathhouse consisted of cultural proveniences ( features and layers) in addition to a square, dry-set, fieldstone house foundation. The proveniences contained artifact fragments recovered by screening (1/8th inch) the soil as it was excavated. The artifacts

\*This interpretation came from Auburn Manor residents. Renner on the other hand says the pipe brought needed water to the manorhouse but that this occurred during the drought of 1935.

*in Appendix E below*

and their proveniences are tabulated with cross-references! The data is then analysed in terms of the five phases of the site: Phase 1: Preconstruction Phase, Phase 2: Springhouse phase; Phase 3- Bathhouse Phase; Phase 4A: Abandonment Phase; Phase 4B: Destruction Phase.

Table 2. Cultural Proveniences of Feature 1, Spring-Bathhouse, Check 4

Provenience	Location	Shape/Substance	Function/Phase
<u>Features:</u>			
F1A	Figs. 8, 16, 17	Square, iron pipe	To drain spring water from Feature 1. Phases 2, 3
F1B	Figs. 8, 10, 16, 17	Square, iron box Table 3	Catch basin for spring water in Feature 1. Ph. 2, 3.
F1C	Fig. 12	Wedge-shaped, back-filled trench. Tables 6, 7	Builder's Trench. Phase 2
F1D	Figs. 7, 8	Rectangular Trench Table 7	Dug to accommodate F1R, stone drain. Phases 2, 3
F1E	Fig. 17	Sq. hole in stone wall w/iron grill	Air inlet into F1 above water outlet, Phase 2.
F1F	Fig. 15	Indentation in grid west wall	Mistakenly identified as window sill - fallen stones
F1G	Fig. 7	Iron pipe	Providing water from F1 to Auburn Manor, Phase 3?
F1I	Figs. 8, 9	Short iron pipe	Support F1S brick drain, Ph. 3
F1J	Tr. 5A, grid N half	Depression w/post remnant. Table 9	Possible fence post, Phase 2
F1K	Ditto	Circular hole	Fence post hole, Phase 2
F1L	Fig. 14b	Wedge-shaped cut, back-fill. Tb. 3	Back cut to accommodate F1 stone wall, Phase 2
F1M	(Same as F1W)		
F1N	Trs. 8A, 8, 9A, 9	L-shaped earth fill. Table 3	Loose fill under Bathhouse floor over Spring trough to accomodate water flow. Ph. 3
F1O	Fig. 7, 8	Rect. or Sq. stone slabs. Table 4	Bathhouse floor, Phase 3
F1P	Edge of F1B	Debris fill. Table 3	Fill to hole-up small section of B.H. floor. Ph. 3
F1Q	Fig. 11	Shallow pit. Table 8	Poss. part of trench dug during B.H. construction. Phase 3?
F1R	Figs. 7, 8	Piled stone, hollow center. Table 7	Stone drain outlet of water from F1 spring. Phase 2.
F1S	Figs. 9, 10	Double row bricks w/Y mouth. Tb. 3	Drain for spring water under B.H. floor. Phase 3
F1T	(Same as F1W)		
F1U	Fig. 18	Square opening in wall w/grill	Water inlet into spring troughs F1W, later into F1S Phases 2, 3
F1V	Fig. 8	Sandy mound lobe w/bricks	Channeled excess spring water under B.H. floor. Ph. 3

<sup>a</sup>Top of F1B is Phase 3. - 50 -

Table 2. (Continued)

<u>Prov. nience</u>	<u>Location</u>	<u>Shape/Substance</u>	<u>Function/Phase</u>
F1W	Figs. 8, 9, 10, 11, 15, 16, 17, 18	Elongated wooden boards, 2 abreast Table 3	Springhouse water trough Phase 2
F1X	Fig. 8	2nd smaller sandy lobe w/bricks. Tb 3	Same as F1V
F1Y	Figs. 8, 14	Rectangular stone	Entrance step of F1, Ph. 2, 3
F1Z1	Tr. 5, Grid W and N	Shallow pit	Poss. animal burrow, Ph 4B
F1Z2	Tr 5 prof. (SE corner)	Trangular hole	Stake hole. Phase 2?
F1Z3	Seen in Prof. Grid E, Tr. 6 Gr. W Tr. 3	Shallow bowl-shaped depression Table 8	Pathway leading to F1 entrance. Phase 2, 3
<u>Layers</u>			
L1A	Beneath BH Fig. 9, 10 Grid N half of BH floor	Table 3 Thin, dark soil	Foundation fill under BH flagstone floor. Ph. 3
L2B	Under entrance BH fl.	Clay layer	Ditto
L3	Ditto	Dark, sandy fill	Ditto
L3A	On top F1W trough	Water born sand patches	Deposited by spring water. Phase 2
L3B-6	Under F1W trough	Top L6 subsoil	Prob. Phase 2
<u>Layers</u>			
L1	Above BH Fig. 10 Covers F1	Table 6 Dark soil	Humus, Phase 4B
L2	Ditto	Mortar, plaster, stone, soil	Building rubble, Phase 4B
<u>Layers</u>			
L1A	Fig. 9, TP13 Between & beneath F10	Table 6 Dark soil	Fill around flagstone floor, Phase 3
L2B	Below BH floor	Clay	Foundation for BH flagstone floor, Phase 3
L3	Ditto	Dark Sandy fill	Ditto
L4	Ditto	Sand w/brick frags.	Poss. remnants of Spring House brick floor, Ph 2
L5	Ditto	Sandy w/slag	Slag foundation of SH, Ph. 2
L6	Ditto	Sandy clay	Subsoil, Phase 1

✓ # The ~~survey~~ <sup>recovered from</sup> of Feature 1 are presented in tabular form <sup>for comparison</sup> along with an analysis of the brick fragments in appendix E below.

Table 2. (Continued)

<u>Provenience</u>	<u>Location</u>	<u>Shape/Substance</u>	<u>Function/Phase</u>
<u>Layers</u>	<u>Fig. 11</u>	<u>Table 6</u>	
L1	Tr1-1A	Thin dark soil,	Present humus, Phase 4B
L2		Dark soil, Archit. debris.	Destruction BH, Phase 4B
LTop3		See L3	Top old humus, Ph. 4A
L3		Dark soil, charcoal flecks	Old Humus, Phase 3, 4A
L3A		Sandy red soil, charcoal flecks	Water heating area? Ph. 3
L4		Clay, mixed sandy soil, stone	Fill to divert flow of SH water thru FlU, Phase 3
L5		Silty soil, field stone layer	Original stream base SH water, Phases 2
L6		Sandy clay	Subsoil, Phase 1
<u>Layers</u>	<u>Fig. 12</u>	<u>Table 7</u>	
L1	Tr2-2A	Thin dark soil w/ stones	Present humus, Phase 4B
L2		Archit. debris, dark soil	Destruction of BH, Ph. 4B
L3		Dark soil	Old Humus, Ph. 3, 4A
L4		Mixed clay, sandy soil, brick frags.	Fill to divert spring water under BH floor, Phase 3?
L5		Mixed coarse sandy clay	Fill, same as L4
L6		Grey Clay	Fill, same as L4
L7		Sandy clay	Subsoil, Phase 1
<u>Layers</u>	<u>Fig. 13</u>	<u>Table 9</u>	
L1	Tr5A	Dark soil	Present humus, Phase 4B
L3		Mixed clay & dark soil	Fill for wall cut into hill, Phase 2
L3A		Mottled clay	Fill, Phase 2
L4		Sandy clay	Subsoil, Phase 1
<u>Layers</u>	<u>Fig. 14</u>	<u>Table 11</u>	
L1	Tr. 6-6A	Dark soil	Present humus, Phase 4B
L2		Archit. debris, Dark soil	Destruction BH, Phase 4B
L2A		Dark soil	Old Humus, Phase 4A
L2B	Inside BH	Ditto	Ditto
L2C		Ligt sandy loam	Phase 3
L2D		Ditto	Ditto
L3		Dark soil	Old Humus, Phase 2, 3
L3A		Dark sandy soil	Occupational zone, Ph 2, 3
L3B		Iron ore nodules	Furnace debris, Phase 1
L4		Sandy clay	Subsoil, Phase 1

to p. 69

## Analysis of Finds of Feature 1

### The Stratigraphic Situation.

The basic stratigraphy of Feature 1 is given in the composite profile CD located near the inside east wall (Fig.10). Phase 1, the preconstruction period, is represented by the natural sandy clay subsoil on which the springhouse was constructed. Phase 2, the Springhouse period, is represented by the wooden trough level used to channel spring water and the catch basin. Within the trough which flanked the four walls is a raised fill platform (L3) topped by the remnants of a thin sand layer containing fragments of bricks (L2C). Due to the fact that the center of the bathhouse was not excavated the brick springhouse floor remains conjectural. The conversion of the springhouse into the bathhouse is represented in this profile by the fill platform (L2B which supported the bathhouse floor (L2A) composed of massive flagstones (F10). The destruction period of the bathhouse, Phase 4B, is represented by the fill layer (L2) containing quantities of architectural debris. The present humus (L1) covers the site.

Additional basic information on the cultural phases of Feature 1 is given in Fig.14 a and b, profiles located outside F1. A profile outside the door step shows an old humus layer (L3A) interposed between the pathway of the Springhouse Period (Phase 2) and the construction of the bathhouse (L2C - see Fig.14 b). The designation Phase 2A is given to this hiatus in time between the spring and bath functions of Feature 1. Phase 2A is also seen in profile EF (Fig.11) in L3. A similar period of relative quiescence during which time humus accumulated also occurred in the time elapsed between the abandonment of the bathhouse and its destruction. This phase, designated Phase 4A is represented by another "old humus" seen in L3 of Fig.14 a and L2a of Fig.14 b. Other profiles with special interpretation of the career of this site are given on the specific profiles (Fig.9-18) and will be referred to in the discussion of the details of the phases.

### Phase 1, Preconstruction Period

Evidence: The sandy clay subsoil underlay all features and layers of Feature 1. In front of the entrance a small depression in the subsoil contained natural iron ore nodules (L3B, Fig. 14b). Elsewhere only sterile subsoil represented the preconstruction phase.

#### Interpretation:

1. Prior to the construction of Feature 1 the area was stripped to the subsoil removing humus and any archaeological materials which may have been present.

2. The presence of natural iron ore nodules in L3B, depression,

suggests that iron-working activities were going on in the adjacent areas at the time of construction.

## Phase 2. The Springhouse Period

Evidence: Fourteen features and 8 layers (Table 2), in addition to the stone walls of the house and its entrance stone, are associated with the Springhouse period. The features include grilled intake and exit openings in the walls for the spring water, a square, iron exit pipe, a square catch basin, a wooden trough flanking the inside of the four walls to channel the water, a conjectured raised and bricked floor in the middle of the (unexcavated) portion of the Springhouse, and a pathway (Table 2).

The artifacts associated with Phase 2 features and layers are considered to be functionally and chronologically related to the springhouse activities (Table 3-10). Most of the pottery associated with this period (33 sherds, 21% of Phase 2 pottery) came from a water-born sand layer on and beneath the wooden trough boards, and on top of them under the overburden of Bathhouse phase construction. The pottery is comprised of kitchen-related wares manifested in small fragments (most sherds under 1" in diameter) of dishes and crocks. Many of the sherds were dateable (see footnotes Tables 3-10) but the red ware, identified as a local variety (see above) was not at this time. The sherd collection included 20 sherds of pearlware ware, late cream ware, transfer print ware, and others dated from 1820-1860. The builders' trench Feature 1C contained functionally related materials including: digging tool fragment, architectural debris (nails, plaster, brick - Table 5, 6). Dateable nails found in the debris of Phase 4B, destruction of the bathhouse period, of the early 19th century also probably belong to the Phase 2 period.

### Interpretation:

1. Feature 1 was initially built as a springhouse.
2. Spring waters which naturally surfaced in the area were channelled through the stone-walled structure along the inside walls by wooden troughs and, after being collected in a square iron catch basin exited through a barred grill on the down-hill side. When soil is removed in excavating the same process continues at present.
3. Food requiring preservation or cooling were placed in ceramic kitchen-ware on the wooden troughs, partially emersed in the cold spring water. During the years of use as a springhouse many ceramic containers were accidentally broken. It may be assumed that the bulk of the broken vessel would be removed, but that small sherds would be lost and concealed in the sand and silt layer which collected on the wooden boards.
4. The springhouse was in operation from 1815 or 1820 through 1860 as indicated in the dateable ceramic and nail artifacts.

5. An old humus layer, underlying debris of the Bathhouse construction period represented a period of abandonment (Phase 2A) about the Civil War period, which may have been a cause of that abandonment.

### Phase 3, The Bathhouse Period

Evidence: Nine features and 14 layers represent Phase 3. These proveniences are in addition to the square iron pipe, the square iron catch basin, the drain trench, the pathway, and ofcourse the stone walls with their grilled inlet and exit openings, which were shared with Phase 2 at which time they were erected. The new features of the Bathhouse Phase included a "Y"-row of bricks, 2 sandy lobes, and a loose fill, designed to channel the spring water flow from the inlet grill to the catch basin. These construction features are located beneath several fill layers that built-up and supported the massive flagstone floor. In addition, an iron pipe (F1I) was found under the corner of the floor where, according to oral tradition, the bathtub was situated. (Table 2, Figs. 7, 8, 15, 16, 17, 18, 19).

Some of the artifacts associated with Phase 3 features and layers were functionally related to the construction of the bathhouse. These included: bricks used to channel the spring water beneath the bathhouse floor (F1S); flagstone spauls (94 fragments), Nails (182 nails), mortar (39 fragments), and plaster (39 fragments). The high proportion of brick fragments found in the fill (549 fragments) could have been the result of dismembering the conjectured springhouse brick floor to get the bricks used in the "Y" drain. A quantity of potsherds were found in the bathhouse fill. Some of these sherds were of the Springhouse time period and along with early type nails must have been accidental inclusions. However sherd types and nails characteristic of the 2nd half of the 19th century were also found. Other later 19th century artifact types found in the fill included: amber, blue-green and clear bottle glass (62 fragments). One such fragment had raised letters with "Carter's 8" in evidence - a type recognized as post-1867.

### Interpretations:

1. Following a period of relative disuse of the Springhouse about 1860, it was converted into a bathhouse.
2. The Bathhouse construction raised the floor by the use of several fill layers and capped it with thick flagstones. A "Y-shaped" brick drain and several other devices ensured that the spring water would continue to flow into the Springhouse period catch basin.

3. A bathtub, observed by two interviewees, was served by the water from the catch basin, heated outside, and drained into the "Y"-shaped sub-floor drain through an iron pipe (FlI. Room partitions were also reported but no specific evidence of these or the bathtub were found. However, there is nothing to suggest that the two interviewees, reliable witnesses, were incorrect, and this phase of oral history may be accepted as true.

4. The features and layers of Phase 3 contained some artifact fragments similar to those recovered from Phase 2 features and layers. The Phase 3 proveniences also contained some artifact fragments identified as belonging to the later 19th century period. It is believed that the construction materials resulted from a removal or rearranging of Phase 2 construction within the house. Kitchen-related materials including dishes and crocks were considered by and large not related to the bathhouse activities, but were accidentally included with fill, probably secured from dump debris nearby the Spring-Bathhouse. Also included with the fill were later 19th century sherds and glass fragments which closely indicated the actual time period of bathhouse construction.

#### Phase 4A, Abandonment of the Bathhouse period

Evidence: Three layers of dark soil, largely free of artifacts represent Phase 4A, the abandonment period. The layers are in trenches outside the house (Fig. 11, 12, 14; Tables 6, 7, 10). Oral tradition of the Mcpherson family, occupants of Auburn Manor from the early 19th century to the present time, indicate that about 1915 plumbing was installed in the house and it was no longer necessary to use the bathhouse. The conjectured water pipe is thought to have been used in the latest period in order to get springwater to the manor. A photograph from the family collections shows the bathhouse during the period of abandonment (Contract Archaeology, Inc. 1971, Plate 8B). The photo shows a relatively tall structure (c.10 feet to the gabled roof) with plaster walls and shingled roof. Several interviewees who had seen the house at this time mentioned white-washed clay plaster over stone walls. The humus averaged 6" in thickness

#### Interpretation:

1. The abandoned bathhouse whose usefulness was over around 1915 existed for some years as a deserted house during which time a dark humus collected around the house along with a few items of modern debris.

#### Phase 4B, The Destruction of the Bathhouse period

Evidence: Five layers, 4 outside the site and the fifth covering the house foundation, plus the present humus which averaged 3-4" in thickness, represented Phase 4B, the destruction of the site.

(Table 1, Figs 10, 11, 12, 14). The artifacts are (1) architectural debris from the abandoned bathhouse, and (2) a smattering of 20th century artifacts (Tables 4, 6, 7, 10). One interviewee thought the house was demolished in the building of the existing U.S. 15 alignment. But State Highway Administration officials thought this unlikely since the house was safely removed from the area of active construction. Another interviewee said 3 or 4 feet of stone wall still stood in 1947 at which time wall stones were removed from the house to form the driveway of a nearby residence. The driveway was examined and the stones noted as similar to those excavated with the addition of a white-washed surface. It is also interesting to note that the shingles (slate almost certainly) noted in the photograph described above were not in evidence at all in the excavation.

Interpretation:

1. The abandoned house site stood largely intact from the time period 1915 until 1947 - although the roof shingles and probably interior larger timbers had disappeared during this period.
2. The wall stones were used to flank the driveway of a nearby resident and may be seen there today.
3. The "cannibalizing" of deserted buildings and wall sections of the Catoclin site by local inhabitants has long been traditional in this area and continues to the present time. Sites in protected areas where they are concealed in the jungle of the SHA right of way enjoy a larger protection than those exposed on public land elsewhere.

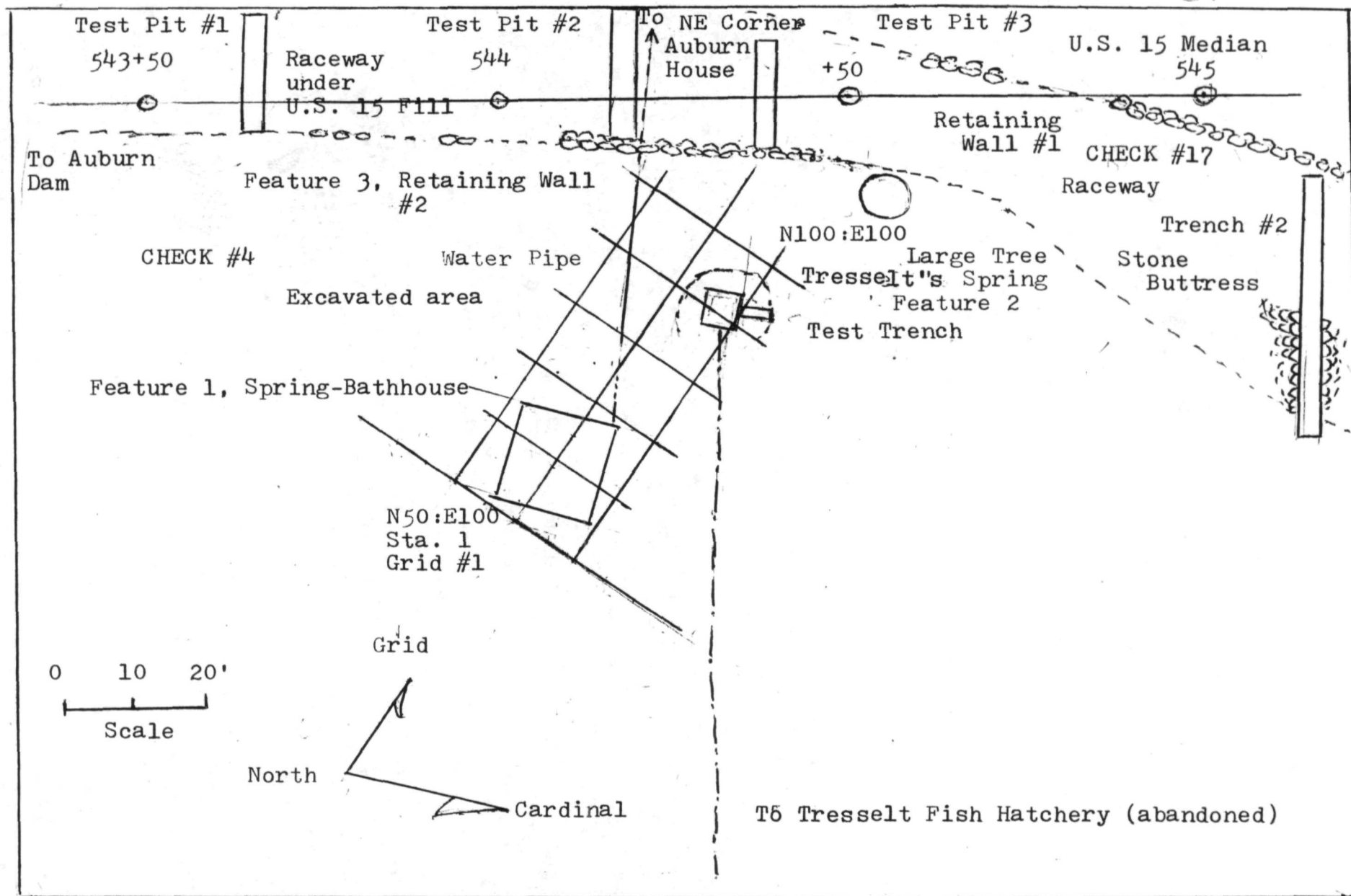


Fig. 6 . Check 4-17. Ground Plan

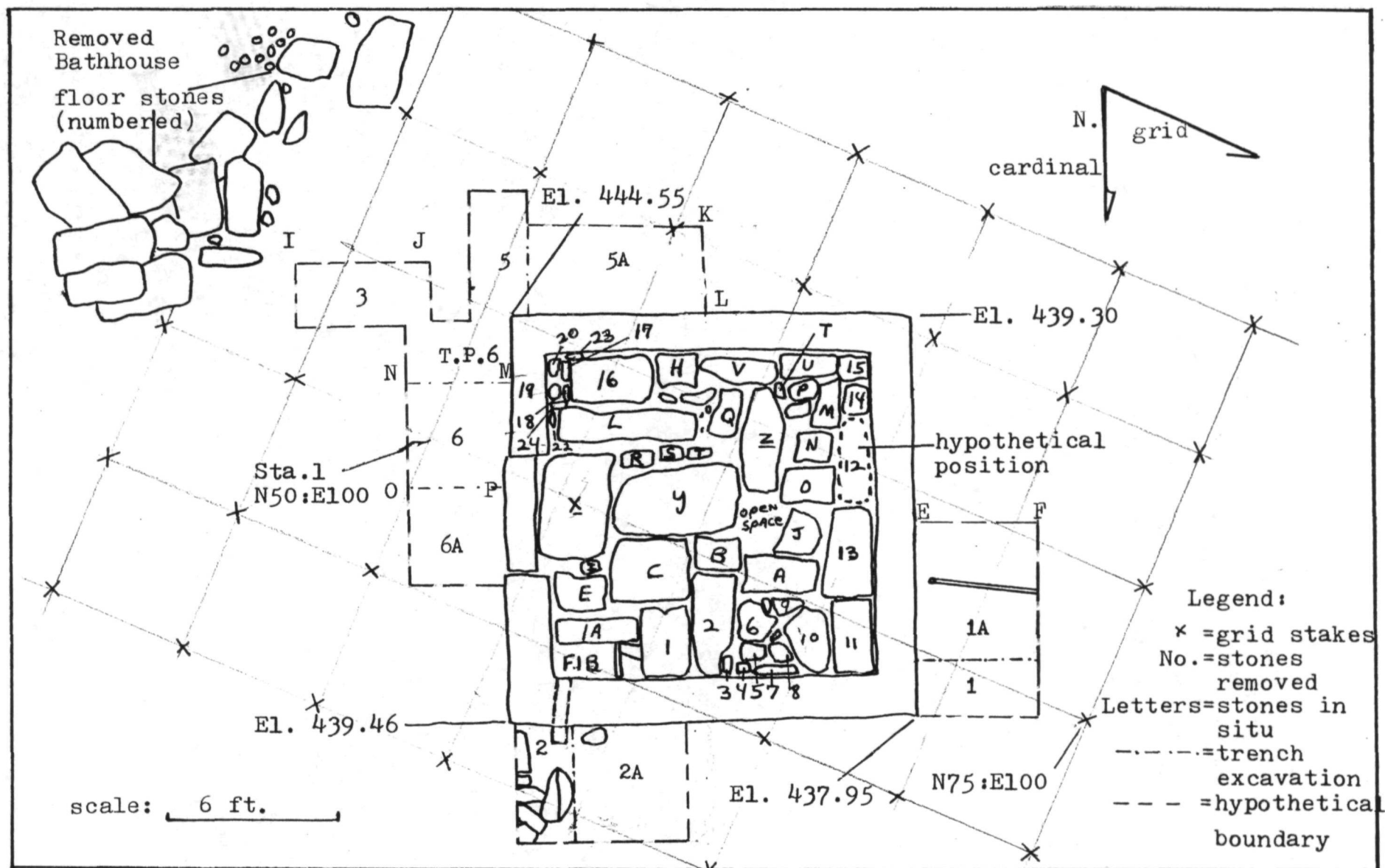


Fig. 7. Ground Plan of Check 4, Feature 1, Bathhouse-Springhouse.

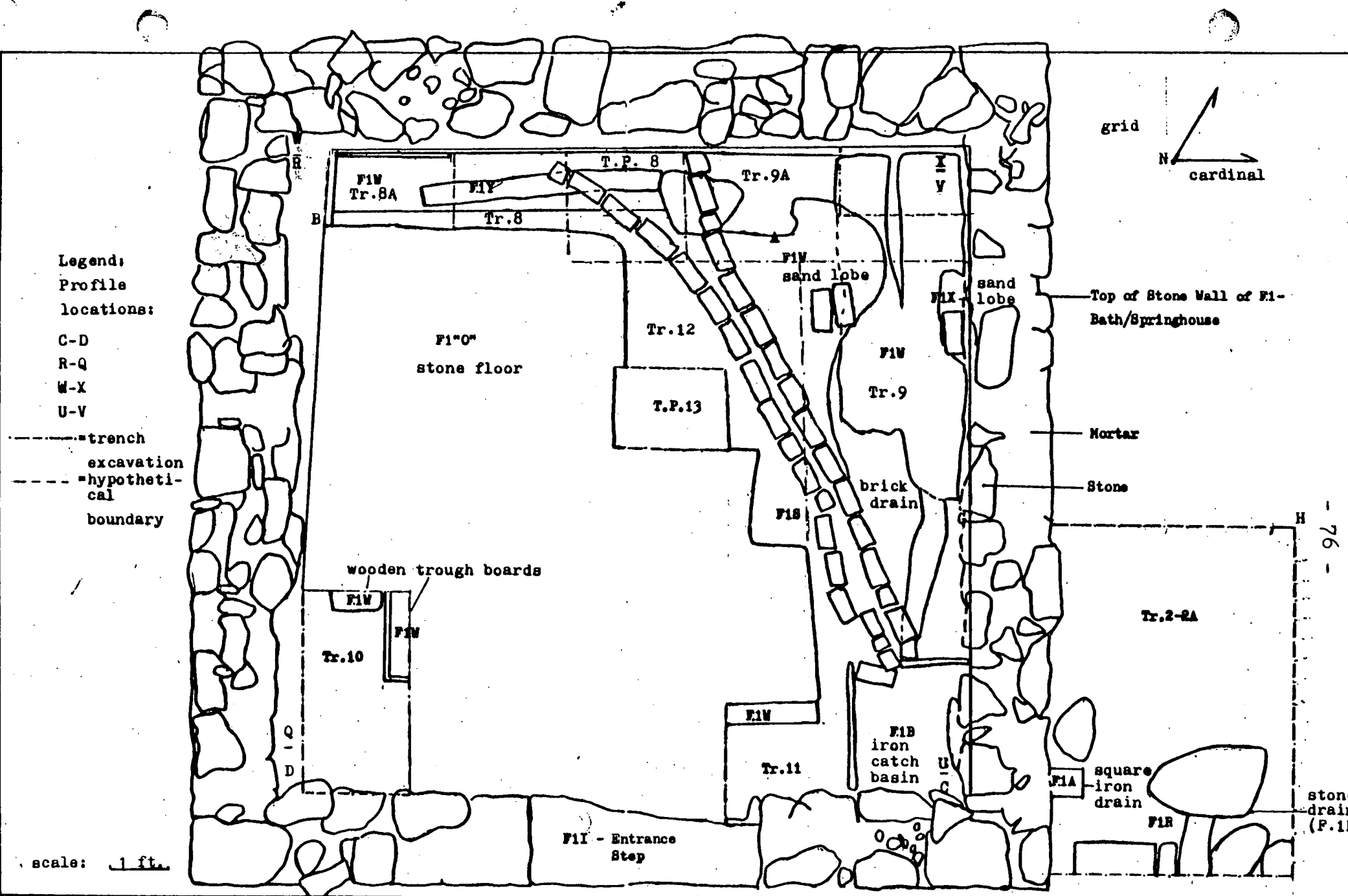


Fig. 8. Ground Plan of Check 4 Features, Bathhouse-Springhouse.

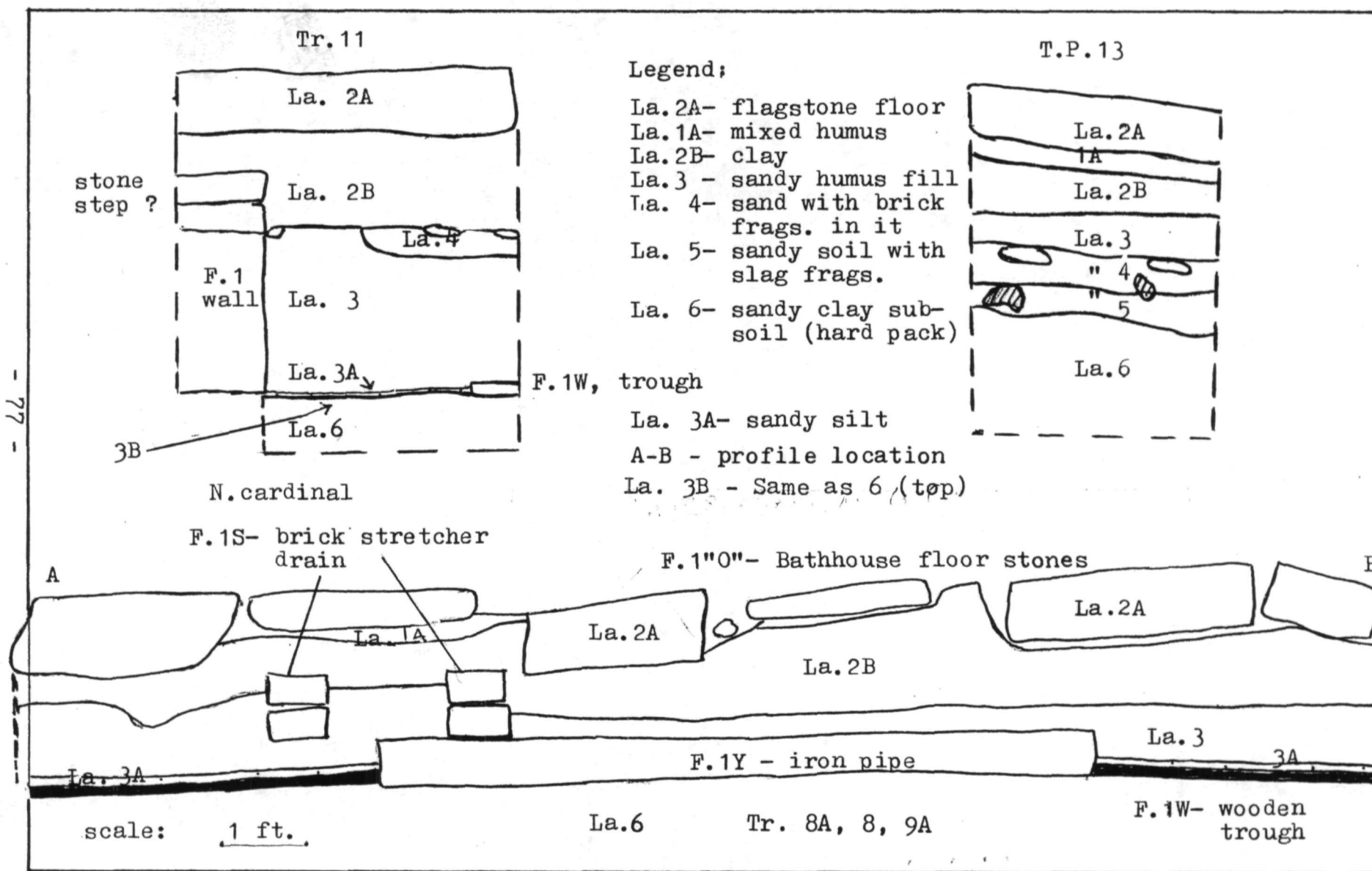


Fig. 9. Profiles of AB (Trench 8), Trench 11 & 13, Check 4, Bathhouse-Springhouse.

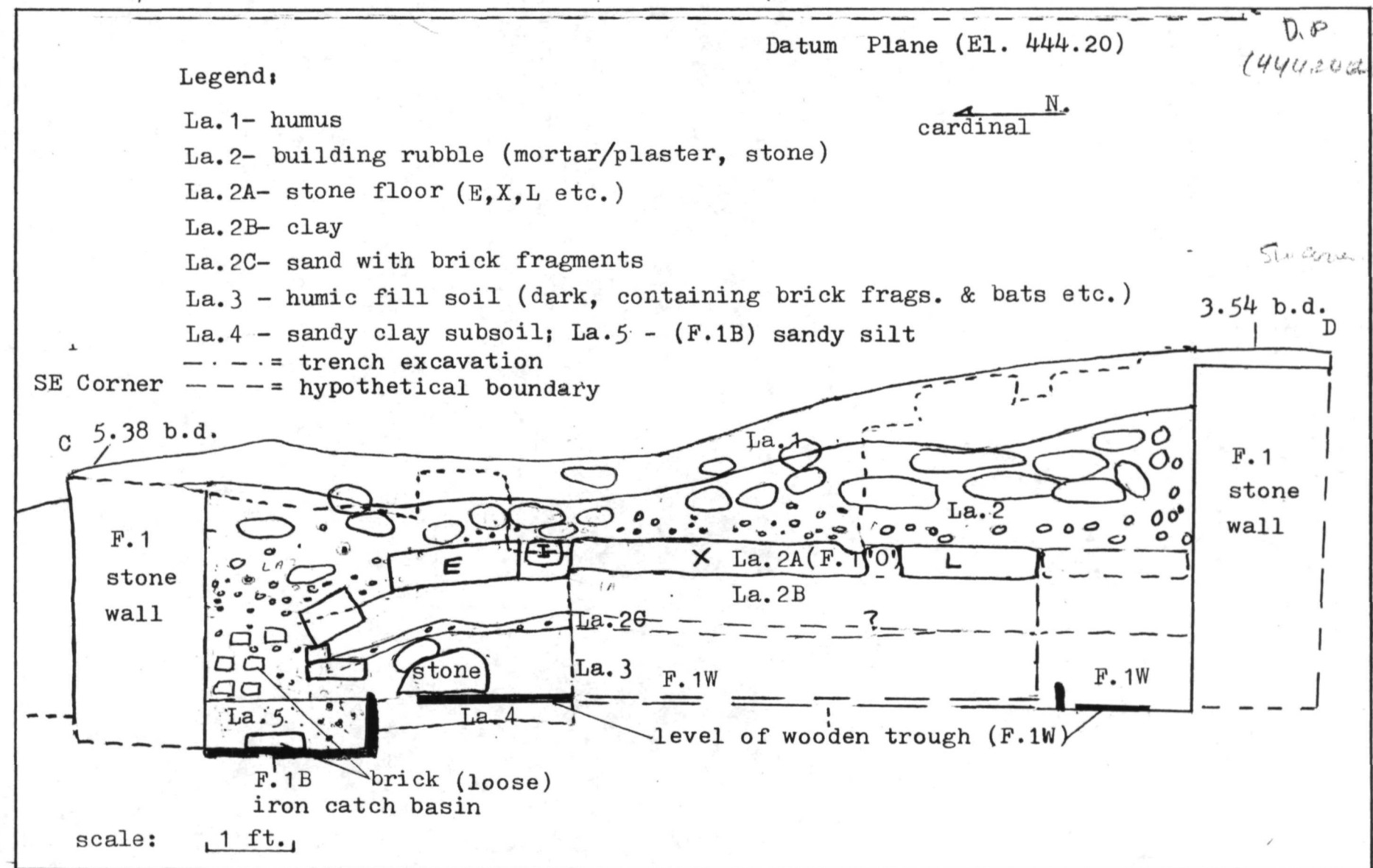


Fig.10. Profile of CD (Trench 10, 11, Inside East Wall of Feature 1) Check 4.

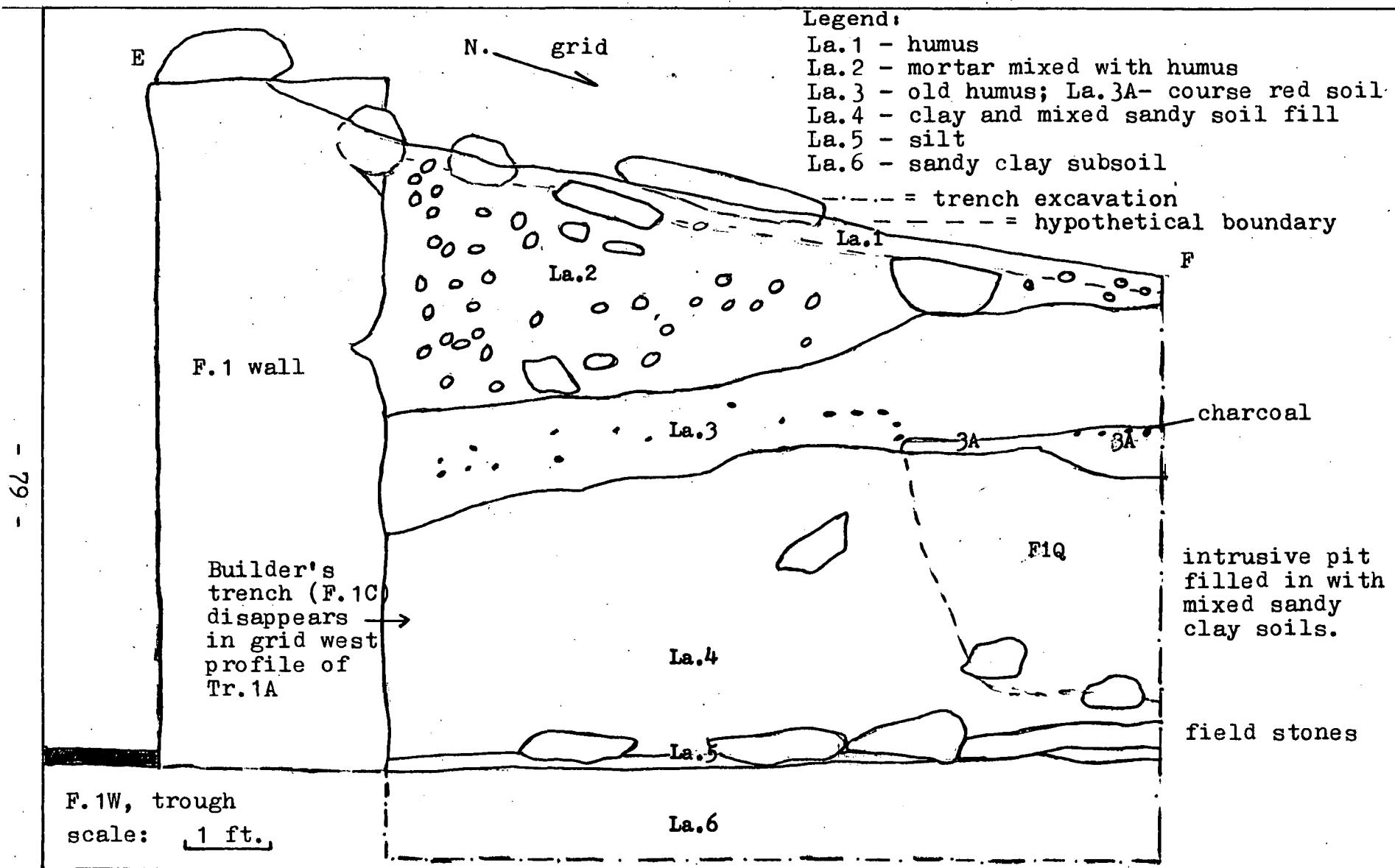


Fig. 11. Profile of EF (Trench 1A), Check 4, Feature 1.

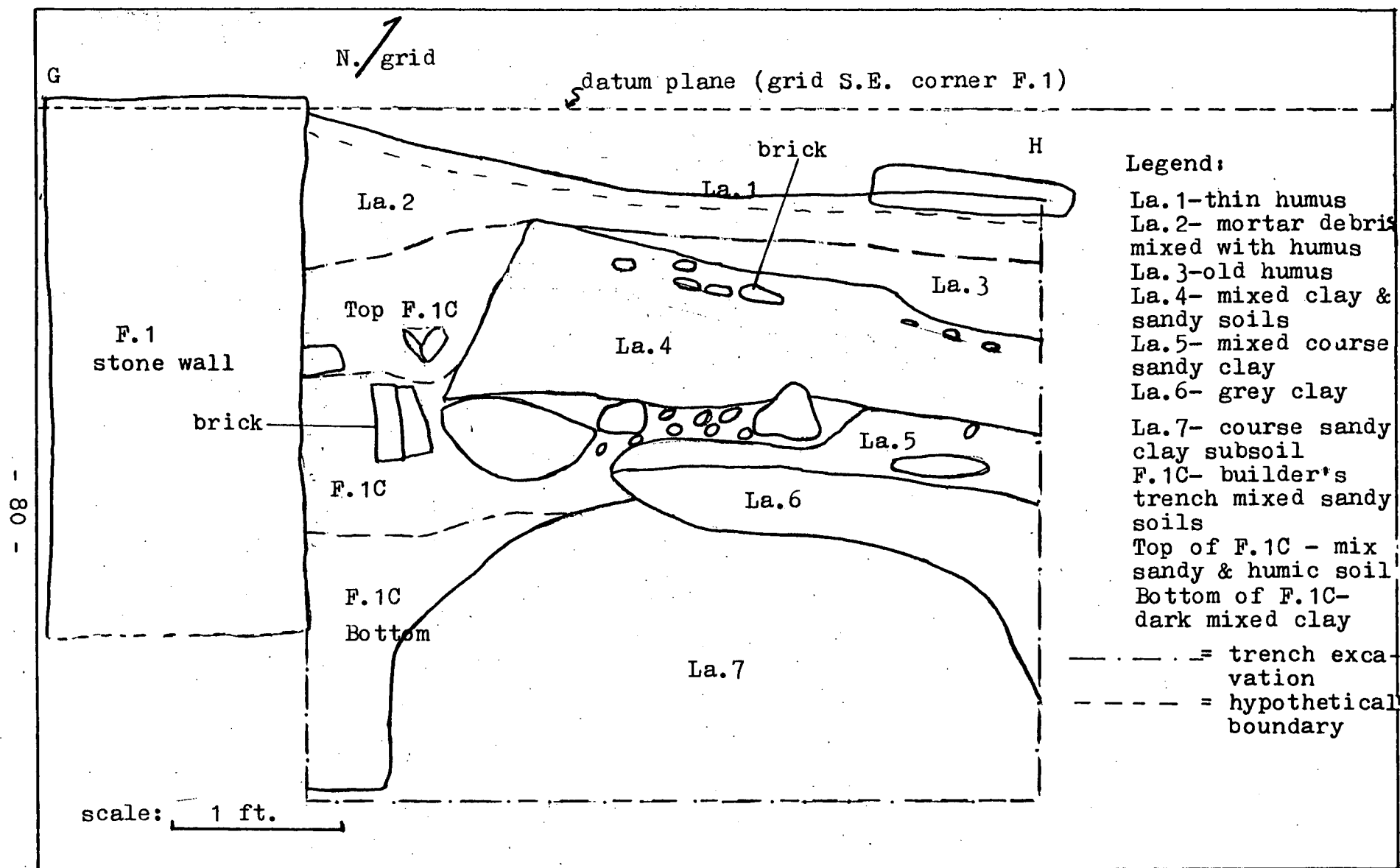


Fig.12.Profile of GH (Trench 2-2A), Check 4, Feature 1.

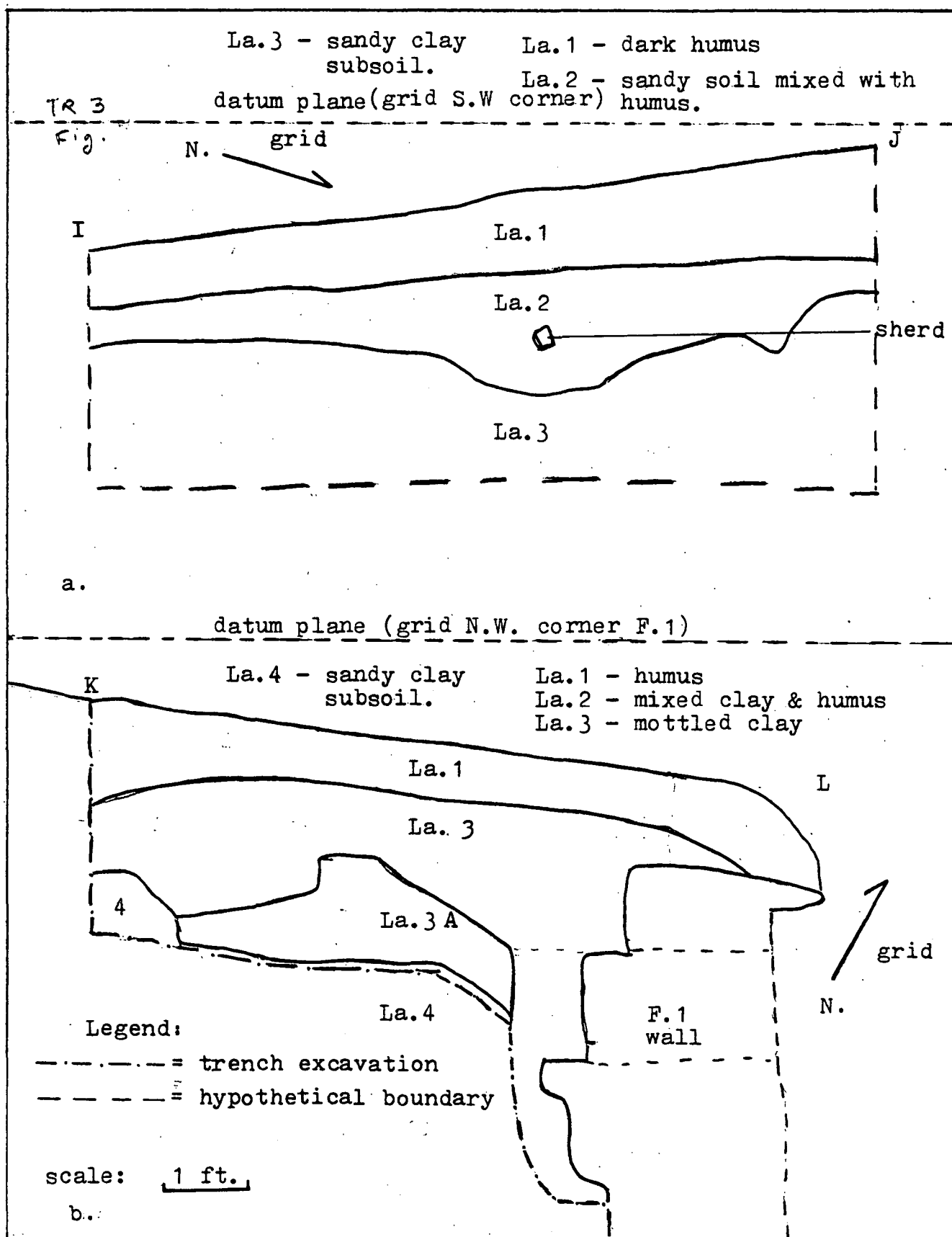


Fig.13a. Profile IJ (Trench 3), b. Profile KL (Trench 5A), Check 4, Feature 1.

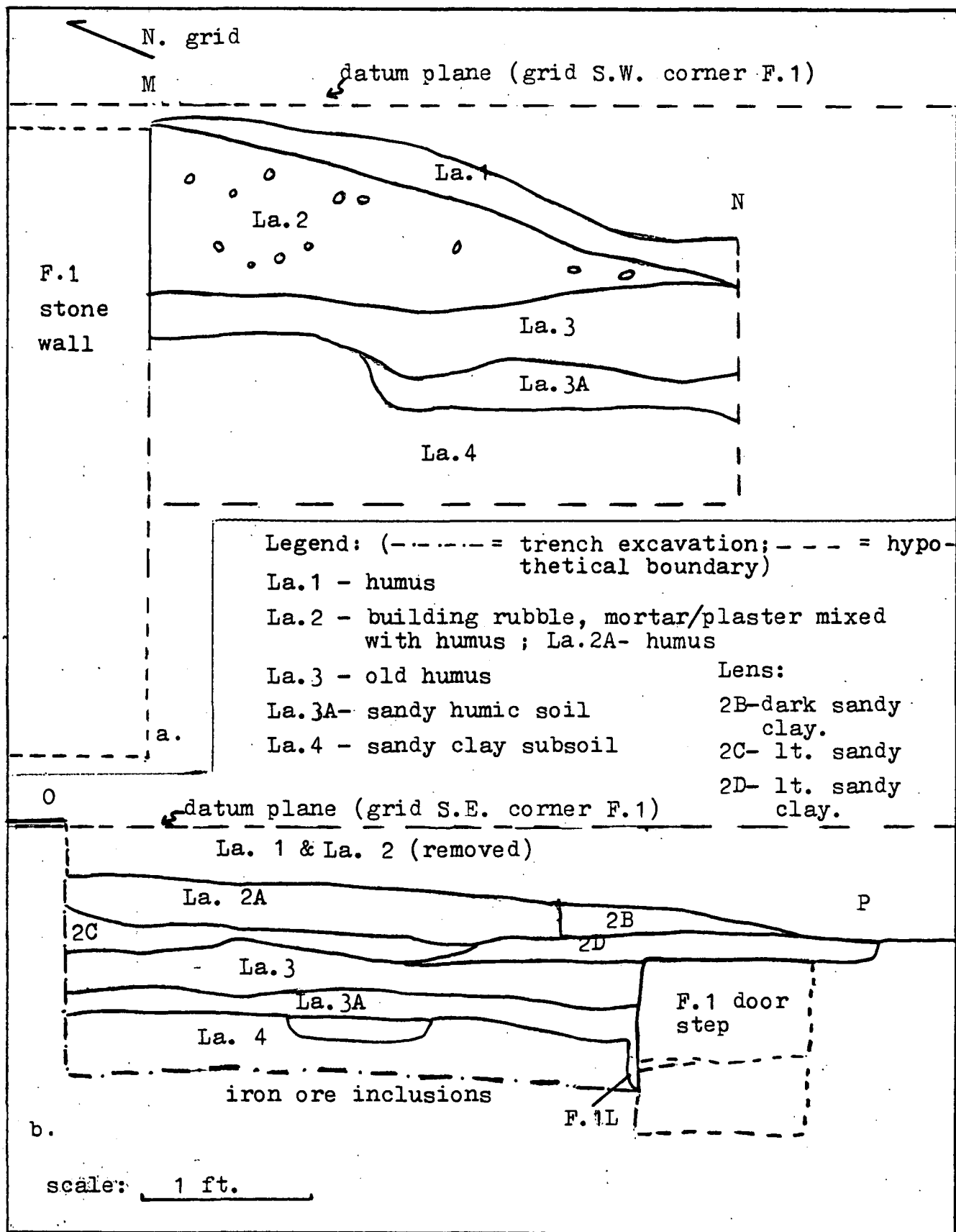


Fig.14 a. Profile of MN (Trench 6), b. Profile of OP (Trench 6A), Check 4, Feature 1.

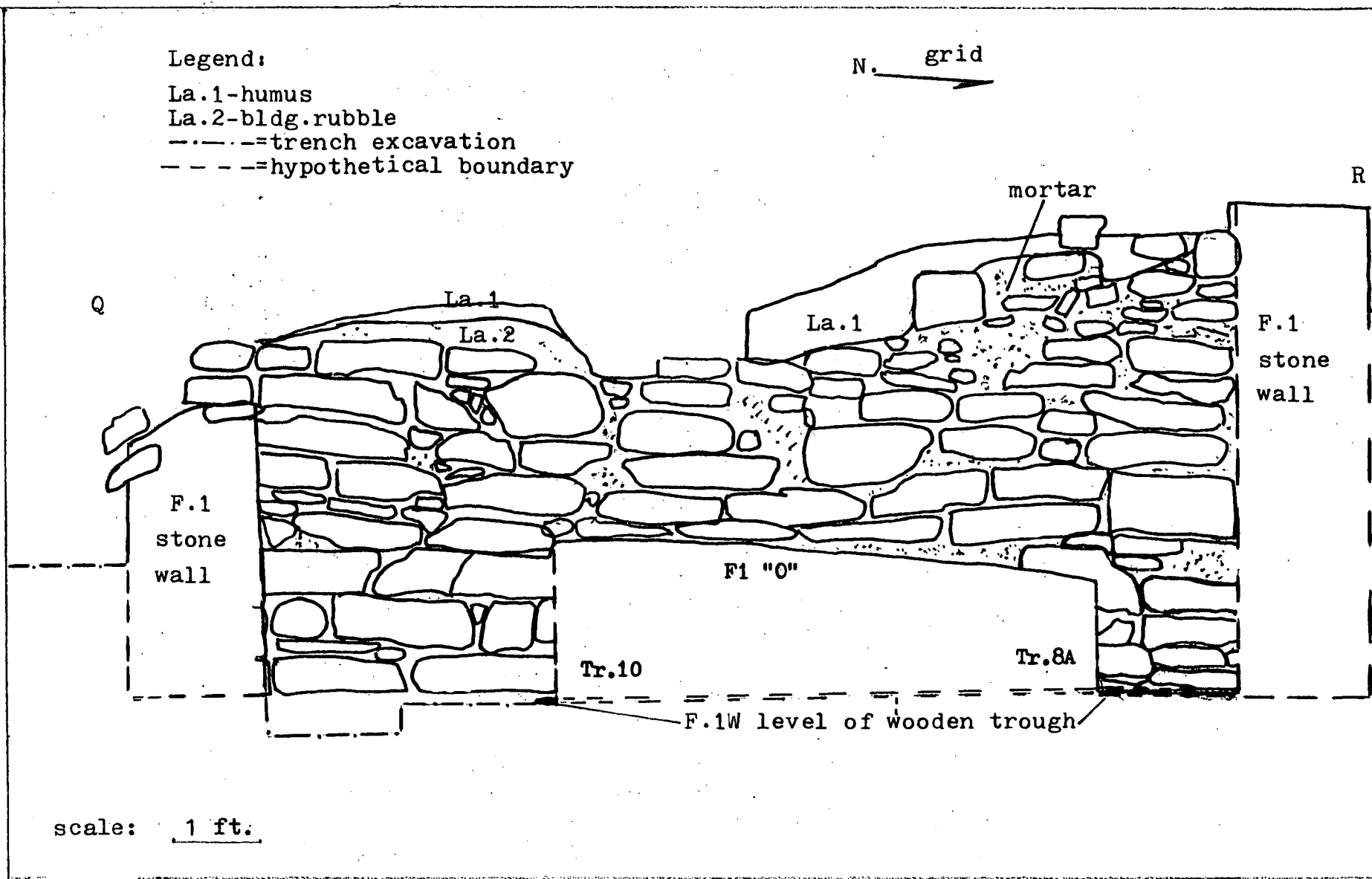


Fig.15. Profile of QR (Trench 8A, 10, Inner South Wall of Feature 1),  
Check 4.

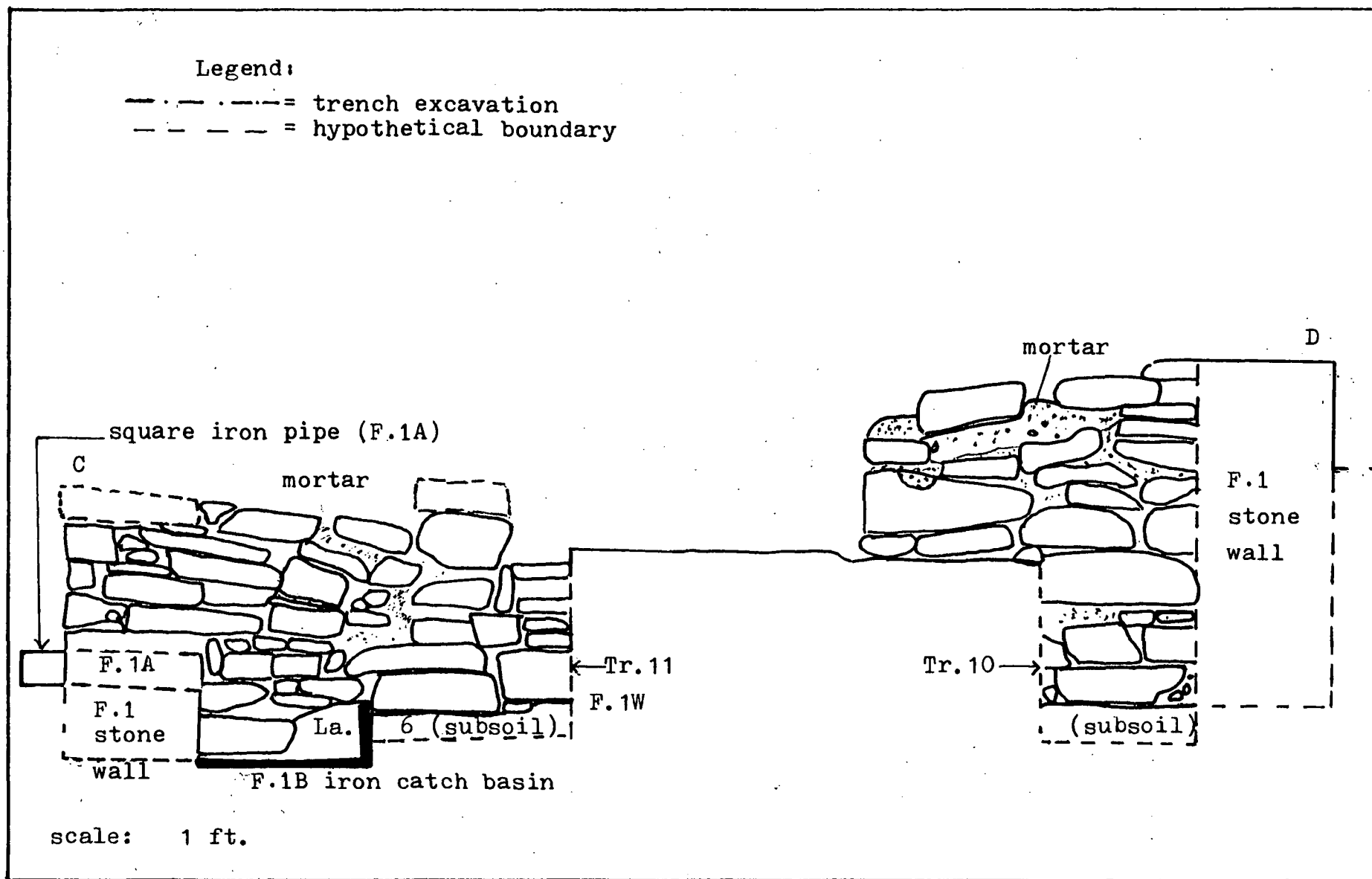


Fig. 16. Profile of CD (Trench 10, 11, East Wall of Feature 1),  
Check 4.

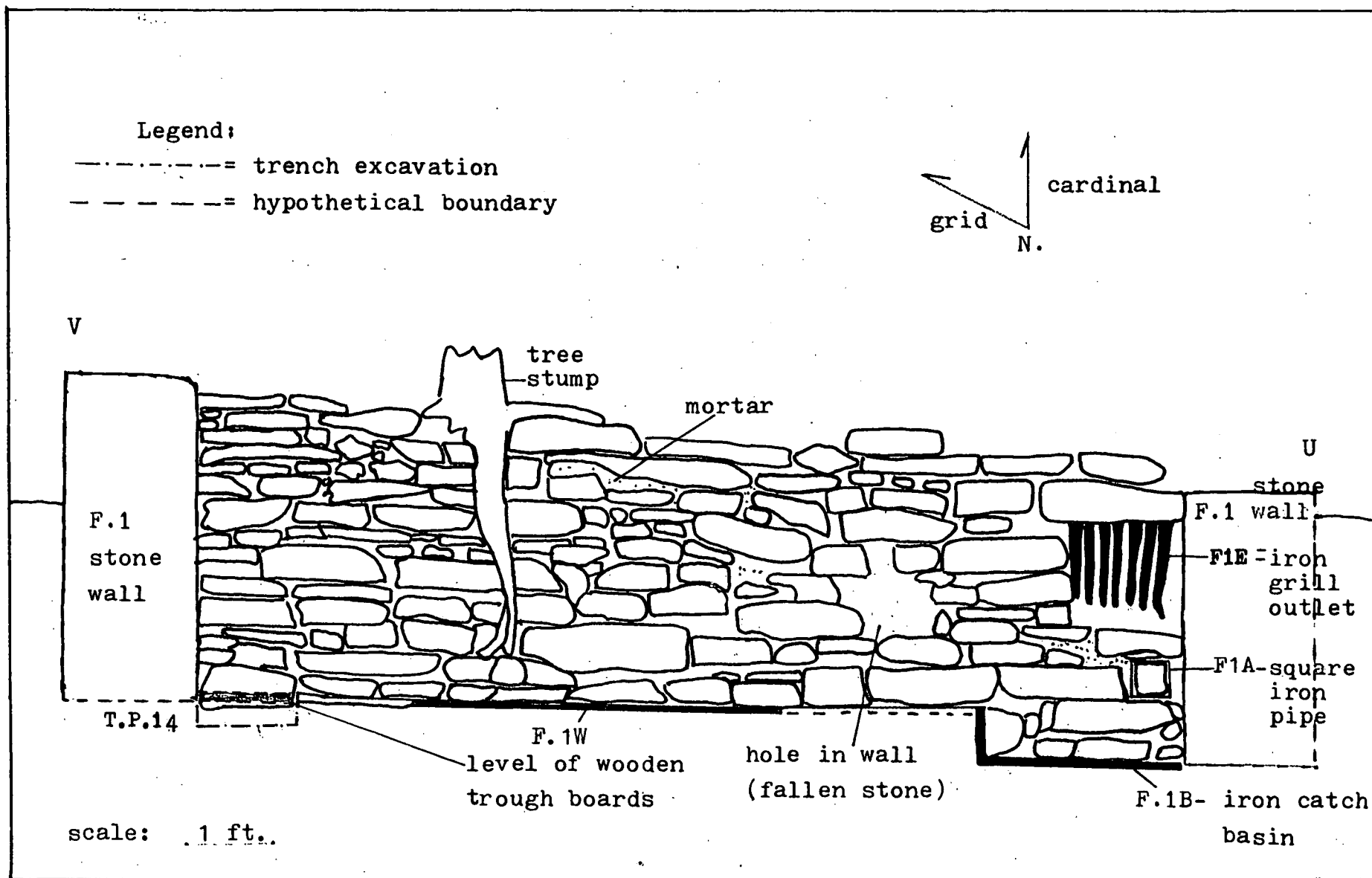


Fig.17. Profile of UV (Trench 9, North Wall of Feature 1)  
 Check 4.

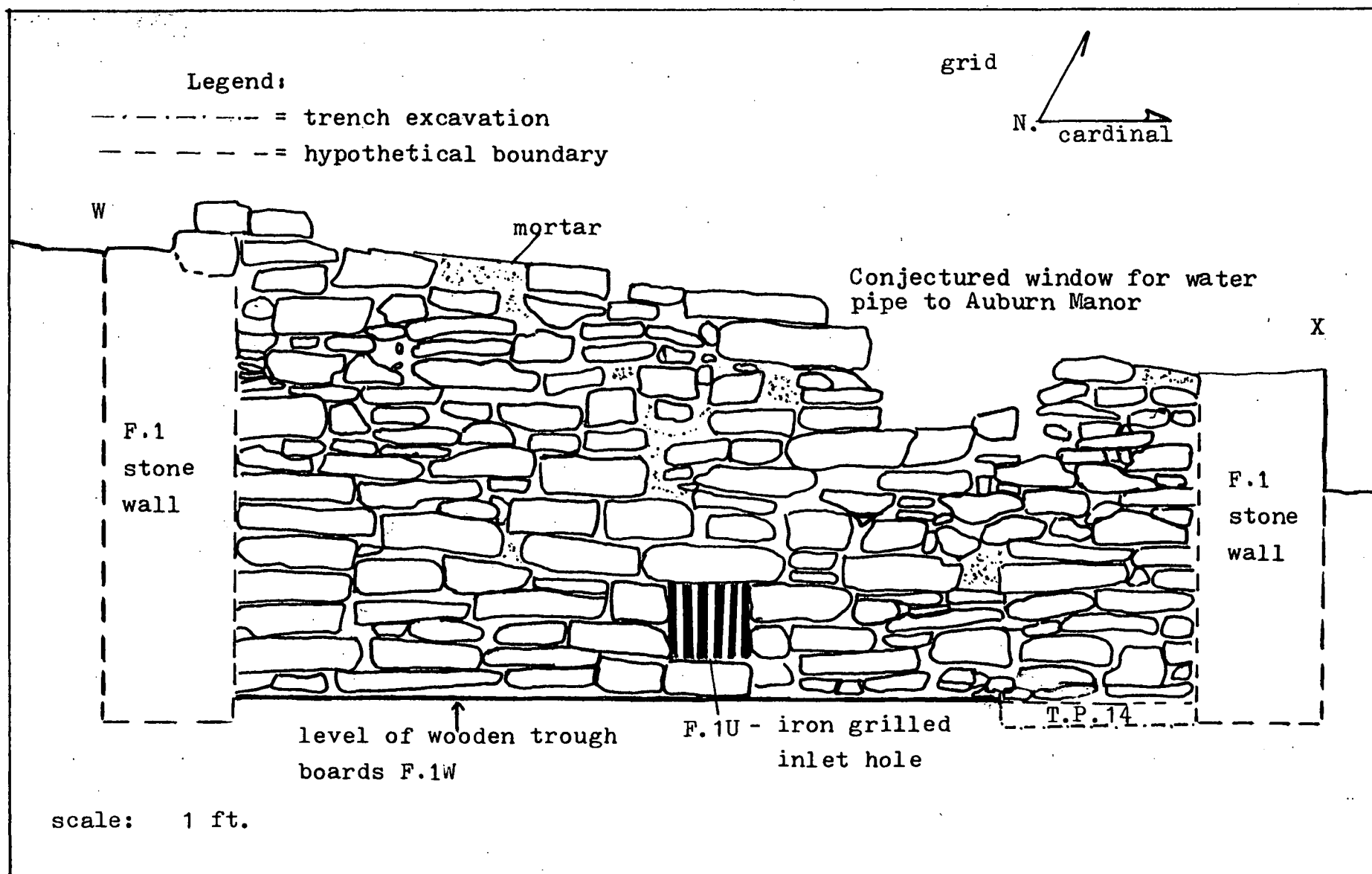


Fig.18. Profile of WX (Trench 8, 8A, 9A), Check 4, Feature 1.

CHECK 9. LIMESTONE QUARRY  
(18FR325)

Research Design

The objective was to mitigate the effect of the impact from road construction on this small limestone quarry site. A partially exposed limestone outcrop was faced by a 40x40' box-like depression approached by a 12 foot ramp. It was planned to excavate up against the outcrop to get information on the techniques used in mining, and hence an idea of the purpose of the mining. A second purpose was the chronological position of the quarry. A backhoe dug an irregular trench across the face of the outcrop.

The 1979 Excavation (Fig. 19,20)

The base of the backhoe trench was approximately 6 feet below the surface of the open pit depression, itself some 7 feet below the surrounding surface of the ground. Quantities of limestone chips 6-12 inches in diameter and smaller came from the lower level of the trench. These chips had obviously been produced by the use of an iron hammer or maul on the outcrop. Quantities of green bottle glass, a three legged iron pot, and a battered liquid container with a small spout (kerosine tin?) were found along with a number of faggots of charcoal. In the 1977 survey refuse soil with small chips of limestone were found overlaying the burial ground (Check 6) directly to the north. At this time burial stones were found (2) keeled over as it were by a horse-drawn slip - the probable method of excavating the quarry pit.

Check 8, alleged silver mine 75 feet southwest of Check 9, was determined to be a miners' test concerned with the same limestone strata which was quarried in Check 9 (Orr and Orr 1977, p.43). Dr. Fauth, geologist of the 1977 and 1979 excavations, came to the conclusion that this limestone, a dolomite, could have been used as a flux but was marginal in its properties, and was probably not extensively used (Appendix A, pp. 15-18).

Cultural Material from Check 9, Limestone Quarry

Catalog #501. Test 3, 10 inches below surface.

- 1 iron object, 8" long resembling a housing for electrical apparatus.

Catalog #502A. Square North 20, East 5, 1 - 8" below surface.

- 1 drawn metal wire.
- 2 clear brown glass (bottle?) fragments.
- 2 clear green glass (bottle?) fragments.
- 5 wood chips

Catalog #502B. Square North 20, East 5, 3' below surface.

- 2 charred branch fragments (firewood?)

Catalog #502C. Square North 20, East 5, resting on limestone outcrop base, 4' below surface.

- 9 limestone fragments 3-5" long, multifaceted.

Note: These are a sample of similar fragments which littered the base of the outcrop. The facets were made by percussion impact of a heavy instrument such as an iron hammer.

- 1 clear, window-glass, fragment, 1/16" thick.

Note: This clear but thin glass is typical of the late 19th century.

- 2 anthracite coal fragments.

Note: Coal fragments were common in the second half of the 19th century and early 20th century.

- 1 black ash fragment (coal ash?)

- 1 iron pot fragment with raised gate ridge at base.

Note: a common cooking utensile during Catoctin Furnace period and probably made nearby (see Check 3).

Catalog #503. Square North 20, East five, 2' below surface.

- 1 iron screw fragment.

Catalog #504. Square North 20, East 5, 5' below surface.

- 1 ribbed metal can with small spout (keosine can?).

Note: Cultural material of Catalog #501, 502A, 503 are associated with use of the quarry depression as a dump in the 20th century.

Cultural material of Catalog #502B, #502C, and #504 are associated with the mining period of the site in the late 19th century.

### Interpretation

1. The limestone quarry was an experiment to get limestone for use as flux in the Catoctin furnace. Larger pieces of the crushed limestone, mauled from the outcrop, were removed for this purpose, and the debris scattered over the nearby ground.

2. The miners ate their lunches in and around the depression leaving charred wood, iron pot, and bottle fragments. Kerosine was used to start the fires. These artifacts appear to be in the style of the late 19th century.

3. Only a few feet of outcrop was removed. The quarry was probably abandoned due to the lack of suitable quality limestone. In Appendix A, Dr. Fauth, geologist of the project, reported that the limestone appeared to have numerous impurities - and that this made it undesirable as a flux ingredient in the furnaces.

### Conclusions

Sufficient excavation was done here to gain the essential facts about the site and to interpret the site as an aborted limestone quarry originally opened in search of flux for the iron-making process. The site is next to Check 8, presumed silver mine which was interpreted to be also a test excavation - looking for iron ore. Oral History informs us that in the last days of the furnace considerable testing for ingredients to use in the furnaces took place. (Orr and Orr, 1977, pp. 40 et seq.)

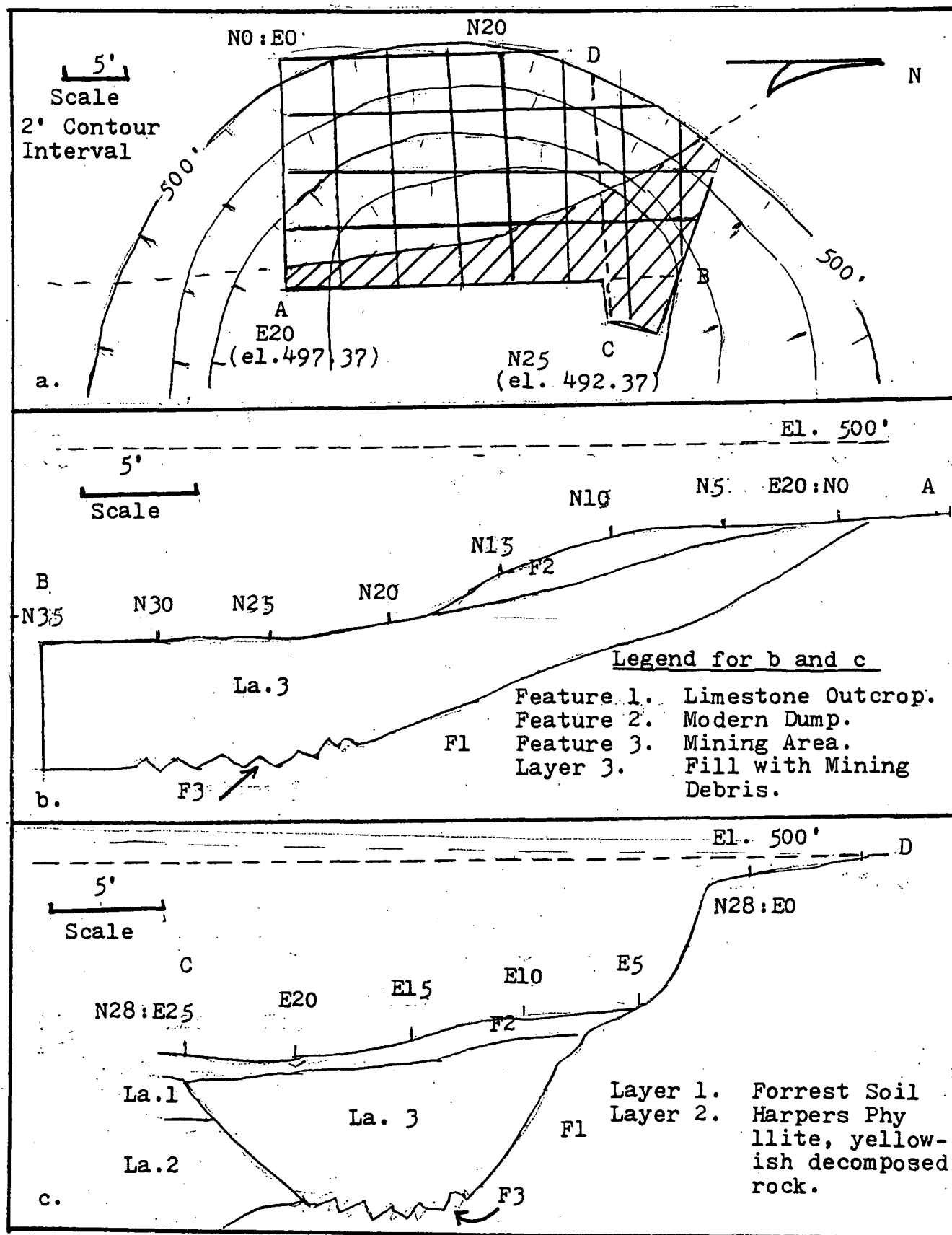


Fig. 20. Check 9, Limestone Quarry. a. Grid #1, Ground plan; b. Profile, E20-N0-N35; c. Profile N028:E25.

CHECK 10. EXHUMED CEMETERY (18FR326)

This site was an exhumed cemetery removed by SHA right of way personnel a few years ago. It contained bodies of perhaps a dozen burials and a headstone bearing the date "1787". On the assumption that other burials might still be present the site was included in the 1979 excavations. It was learned, however, that burial grounds per se including this one did not qualify as historic monuments unless famous personages were buried there. However, it was also indicated that if there appeared to be a possibility that burials were still to be encountered there and if they would be disturbed by the road construction that excavation could proceed. The State Archaeologist and the Project Director visited the site and determined that the site resembled typical family burial grounds. One measuring about 20 by 15 feet and surrounded by an iron fence occurred a mile south and on the west side of the road (well clear of the road construction). It was also determined that the impact would not disturb the soil deeply enough to encounter any remaining skeletons. With this information it was decided not to excavate the site. Request had been previously made to utilize the funds allocated for this site on other sites of the project.

CHECK 11 AND CHECK 12, FEATURE 5  
RACE POND (18FR327)

Research Design

1. The race pond was recognized as a major feature in the hydraulic power system of the iron industry at Catoctin Furnace. Research was designed to explore the origins, functions and dimensions of the original pond now partly buried under the existing U.S. route 15, and scheduled to be nearly covered by the proposed alignment construction. The investigations were accomplished by a series of borings drilled to bed rock by the SHA Bureau of Soils and Foundations and by excavations undertaken by the Consultant's team (Team C). The objective was to reconstruct to the degree possible the history of the pond (Orr et al, July 1979, pp. 29-31).

The 1979 Investigations (Fig.21 )

Geological Investigations - The Borings.

41 borings were taken by the SHA engineers and analysed by Dr. John Fauth and Dr. Jonathan Harrington, State University of New York/Cortland. Dr. Fauth was asked to determine the deep subsurface structure under the pond where standard excavating techniques could not go. Dr. Harrington was asked to study the spore content of the pond and compare it with that of the Auburn Pond. It was hoped to get a spore profile indicating variations in vegetation resulting from timber cutover to satisfy the demands for charcoal. The reports are in the appendices of this report. (Appendices A and B)

Fauth discovered that a depression extending to 50 feet below the surface underlay the pond. The depression contained fill at a minimum of 18-22 feet below the surface. The fill contained evidence of iron ore, iron granules, brick, charcoal, glassy slag, rubble, and wood. He reasoned that this depression was not natural and that it was much deeper than needed for the efficiency of a race pond. It must therefore represent a mine that had been excavated and refilled with debris. Though general rather than diagnostic in nature, pottery was absent, the finds definitely established the proximity of iron-working activities. The Collection is housed in the laboratory of the Department of Geology at SUNY/Cortland.

Harrington prepared a preliminary polynological analysis of 18 samples from the race pond ranging from 0 to 32 feet.

He detected a number of species of trees of the "sprouting" type which invariably spring up when forests are cut over, several flowers associated with open fields, and some swamp plant species. However, the frequencies of the collection were below what was needed for significant results. Also the fact that some of the data came from the fill area raised the suspicion that this was not in situ. Thirdly muck lithologies suitable for recovery of palynomorphs were lacking in the cores of the Auburn Dam site. There was no evidence that selective cutting of timber was employed and the presence of oak and chestnut in most samples confirmed that the forests were clear-cut (approximately every twenty-five to thirty-five years according to Kaylor, 1946) and of the "sprout" type rather than a clearly developed plant succession. The presence of Chestnut predates the racepond prior to the chestnut blight in 1912.

Check 11, Trench 1, Racepond. (Fig.23)

A backhoe trench was cut through the SHA construction layers bulwarking U.S. Route 15 as built in 1960-61. The black muck of the pond was revealed some 3 feet below the overlay mantles of road construction earth. Due to the high water table the cut began to cave-off as soon as it was excavated by the backhoe. No artifacts were recovered. It was noted that the north end of the trench revealed a stone facing to the side of the racepond up against the side of the pond.

Check 11, Trench 7 (Fig.24)

A series of test pits and trenches were placed in the plateau to the north of the racepond area between the pond and the Little Hunting Creek. The strata consisted of mottled grey and tan clay with iron nodules occurring in zones. This resembled the strata found on the washer ramp of Check 15 during the intensive survey of the site (Orr and Orr, August, 1977 p.60 et seq.). Such puddled areas were the result of sloshing water over iron ore to separate the clay and sand from the ore (nuggets and/or ferrous oxide lumps). Such ore washing had taken place at the Trench 7 area directly on the cobbles and coarse sand of the old stream bed. Finally a shallow pit was dug in the top of the mottled clay and used as a dump area. The following cultural material was recovered:

Cat. No. 2048. 52" b.s. at south end of trench. 1 wire spike.

No. 2050. Fl, bottom layer. 19 frags. charcoal, 1 peach pit.

No. 2053, Fl, bottom layer, 2½' below surface:

1 metal horseshoe	4 redware sherfs
3 brick fragments	2 whiteware sherds
5 glassy slag fragments	

No. 2055. Fl, 12-24" b.s.:

- 14 slag fragments, green glass (charcoal furnace).
- 6 glass fragments of a moulded medicine bottle of green glass with "A7" in raised letter on base (2nd half 19th C)
- 9 iron frags. badly rusted spike included.

No. 2058. Fl, 12-24" b.s.

- 7 glass frags. (1 green bottle, 6 clear window).
- 29 rocks (stream worn)
- 2 iron nails. T-head, cut nails (Post 1830 to present)
- 6 slag fragments
- 15 charcoal fragments (1 pig iron end, 7" long; 1 bolt, 1, iron tool like a strap)
- 11 whiteware sherds ("ironware")
- 1 salt glaze greyware sherd (crock)
- 1 crock sherd with white exterior and dark brown interior (late 19th C).
- 2 blue shell-edged pearlware (early 19th C)
- 22 redware sherds
- 1 blue on white porcelain sherd
- 1 peach pit

No. 2064. Fl, 12-18" b.s.

- 3 brick bats, stick molded  $3\frac{1}{2} \times 2 \frac{1}{8}$ " (19th C).
- 19 redware sherds (17 brown glaze)
- 6 rusted nails
- 1 large rusted spike
- 1 Light blue transfer print rim sherd (post 1840)
- 3 whiteware sherds
- 1 curved clear glass fragment
- 1 flat, clear window glass frag.
- 1 frag. clear glass
- 8 slag fragments
- 3 charcoal fragments
- 31 small rock fragments, possibly hematite.
- 4 badly rusted chunk

Interpretation. The first use of the area was to wash iron ore, probably secured from nearby and washed with water from the creek. In the latter part of the 19th century refuse and debris from both domestic and industrial areas were carefully buried here in dug pits.

#### Check 11, Trench 8 (Fig. 25)

This was a deep backhoe dig to old stream bed subsoil. A layer of mottled grey clay from ore washings was sandwiched in between a brown soil fill containing brick fragments and charcoal and a light brown soil stratum containing some furnace tailing. No artifacts were recovered. A path had been cut near the edge of the built up plateau overlooking the creek - possibly to provide stabilization in drainage (SHA for 1960 U.S. Route 15 construction?)

Check 11, Trench 9, ore washings at edge of racepond. (Fig.26.)

This long, backhoe trench started in the filled in racepond bottom and cut into the west bank. The top strata of the bank (6,7,8) consisted of mottled clay, grey and yellow a fill of loose clay and light brown soil. Under the top mantle was an iron bearing strata and a grey clay gumbo. Directly to the east was a heavy sand stratum overlying a light grey clay stratum - both heavily impregnated with water to the point of caving in frequently. No artifacts were found.

Interpretation. The top strata on the bank resembles the drippings from ore washings. It rests, however, on natural strata that is reminiscent of ore mine strata (as in Check 12 digs). The soft strata, sand and clay form part of the original racepond now in a semi dry condition. It appears that this edge of the pond was used for washing ore. The ore washing preceded the use of the area as a pond since the coarse sand layer is superimposed in part on the ore washing layers. Ore mine strata underlies the area. Stratum 2 appears the top part of a fill extending for an unknown depth (borings indicate that this is the edge of the mine which occupied the area prior to the racepond.

Check 11, Trench 10, Ore washings and Berm Ditch. (Fig. 27)

Oral history (Renner) identified the large ditch as the west end of the racepond as a berm ditch to carry off water feeding into the remnant of the racepond from springs located several hundred feet to the north. The same ore washing debris is found in the stratified profile resting as in the case of the trenches discussed above on the old creek bed.

Miscellaneous Tests.

Test pits 1 and 5 revealed the same combination of furnace tailing and ore washing debris noted above.

Trench 6 a mound some 7 feet high and 50 feet in diameter was also tested by a backhoe trench. The mound consisted of largely sterile earth filled with stream-worn rocks and boulders. It was interpreted as the dirt pile resulting from the SHA construction of the berm ditch.

Limestone Outcrop. A mound 25 feet in diameter and 9 feet high was found in the southwest portion of the racepond area. This mound was not recorded on the Maryland Department of Natural Resources April 16, 1978 maps which form the basic maps of our study. The feature is entered as an overlay (Fig.17 ). This mound is a large outcrop of limestone which was avoided in the mining operations. Subsequently the racepond waters engulfed it as an island.

Check 12, Feature 5, Head of the Raceway (Fig. 28 )

A backhoe cut a 32 foot trench 3 to 5 feet wide and 2 to 4 feet deep across the 10 foot deep ditch which formed the head of the raceway channel carrying water power to the furnaces, mills and forges of the Catoctin iron-working complex. The profile of this trench laid bare the stratigraphy of the water channel and revealed a number of phases of development of the raceway.

It was discovered that large fieldstones had been placed at intervals up the slopes of both banks of the U-shaped channel under a mantle of soil 2-3 feet thick. Three to four feet below the surface at the bottom of the ditch a square-bottomed inverted truncated pyramid-shaped cut was seen intruding into the subsoil in both east and west profiles. The cut, measuring 3' wide by 3' deep, was lined with 6 inches of clay. Deposits of sand and small stones were found at the top of this clay lining to a thickness of 4-6 inches. Over these strata was a mixture of humus, clay and sand filling to a depth of some 2 feet from the surface down. The only artifact found in this fill, at about 1' below surface was a piece of modern type clear glass (20th century). On top of the clay lining a piece of anthracite coal was found; and in the clay layer at 14" b.s. a light brown glazed redware sherd was found. The redware was similar to that found elsewhere in Catoctin Furnace site features of the 19th century. The coal suggested the latter part of the 19th century by which time it had become the major source of energy.

The banks of the channeled area were seen to be a series of built up soil layers consisting of a burnt ore layer (4 inches thick) sandwiched in between fill soils. The clay lining of the channel cut ran half way up the banks, higher up the north than the south bank of the raceway. The north bank had about a dozen large stones at the base of its mound. These stones were covered with clay at the edge of the raceway. Large quartz stones were found two-thirds of the way up the north bank and similar large stones were found on N.Bank. The stones rested on the burnt ore layer.

Interpretation. The box-shaped cut at the bottom of the ditch represented the original clay lined raceway channel. The banks of the original raceway were were only a foot or two above the water level. The banks were built up an additional  $7\frac{1}{2}$  feet with furnace tailing and stream sand in stages which were stabilized by the use of the large rocks to give a retaining veneer if not a wall. The purpose of the build up was to provide a channel for an additional flow of water in the raceway. The highest extent of the clay lining then was during the period of greatest need for water, or the fullest development of the water wheel to provide power for the mills and forge but especially for the charcoal blast furnaces. The banks built up of furnace tailing were heavily impregnated with charcoal fragments. With the advent of coal, steam engines replaced the water wheels in providing a hot air blast.

The fill over the clay lining of the water channel was the result of ground water erosion following the abandonment of the water system. Finally, Lanceolot Jacques developed his deer park lakes through the use of the partially filled raceway which conveyed water from the Little Hunting Creek stream much as the original race pond had (see above). Renner reports that at that time a boat could navigate between the race pond and the deer park lake in the Check 12, Feature 2 mine hole; the Check 12, Feature 3 mine excavation being filled in with a stone wall dam.

It is probable that the high point of the use of water power came during the period of overlap of the two charcoal burning blast furnaces Stack No. 1 and Stack No. 2 from 1857 to 1887 (Contract Archeology 1971, Chronological Chart p.37).

According to Renner the remains of a wooden aquaduct was found in the raceway channel just south of the Jacques dam between the two mines. It seems unlikely that a passage would be cut across a vital water channel in search of iron ore, so we must conclude that the aquaduct and hence the water system itself post-dated the mine operations in this area which included the mine which later became the race pond.

#### Observations.

1. Fauth notes the right-angled construction of the west bank of the racepond area and suggests a deliberate cutting of this zone in a mining operation maneuver reminiscent of the box bunkers identified in Check 12, Feature 1A and 1B below. (Fauth, Appendix A, Fig. 3). A road approximately 15 feet wide and 2 feet deep was discovered leading into the mine and heading off to the west (Fig. 21 ).

2. Oral history suggests that water from a spring a few hundred feet west of the northwest corner of the racepond provided water for the racepond. It does provide water for the remnant of the pond which is a mere fraction of the original pond. The excess trickles back to the stream through the SHA berm ditch to the north. (Fig.21 )

3. Post-furnace features constructed by Lanceolot Jacques, owner and real estate developer of the Catoctin Furnace area during the 1920's included: cemented dam and intake valve (dated 1908) for bringing the Little Hunting Creek water into the race pond. The water was used to create lakes in the adjacent iron mine excavations: Check 12, Feature 1 and 2. This was part of his "deer park" development of which Bill Renner, our interviewee, and local expert on Catoctin Furnace oral history, was custodian.

4. Jacques dam had a look of age and stability about it. Although only a foot or so high, it was probably considerably higher originally. A well-developed stone wall extended along the south side of the creek for a distance above and below the dam; and an area 150x130 feet appeared carved out on the low north side behind the dam. In addition, The remnant of an old raceway leads off from the intake valve toward the racepond. It appears probable that Jacques contributed the intake vavle but simply utilized a renovated and lower dam, mill pond on the stream, and the raceway to the old racepond to set up his deer park lakes. It is hypothesized that this same water source was used to augment the spring water in the mine excavations to a point where the pond could function as a racepond in providing energy for the waterwheels of the Catoctin Furnace industry.

5. A large earth and stone barrage (some 200' long by 6 feet high) and cut through by the creek is located some 2000 feet northwest of the racepond. A race way 6-15' wide and 2-4' deep leads off in a southwest direction for a quarter mile or so before it becomes confused with a mountain road. This hydaulic system, which requires detailed archaeological attention in the future, is believed to predate the racepond system. Renner postulates a third millpond to provide yet another water system about  $\frac{1}{4}$  mile east of the furnaces along Windy Farm road which borders the creek.

6. Oral history (Renner) noted presence of remnant of large wooden aquaduct to convey water from tailrace (Check 12 Feature 5) to raceway proper over a gap cause by the connection of iron ore mines Check 12, Feature 2 and Check 12, Feature 3 (not excavated). This gap probably existed prior to the construction of the hydaulic power system out of the racepond - resulting from the earlier mine excavations in that area. Excavations are needed to substantiate this plausible possibility with acquaduct parts preserved in sections under the muck of Jacques deer park lake water supply.

5. The stone dam between Check 12, Feature 2, iron mine, and Check 12, Feature 3, iron mine (probably) was erected in the 1920's by Jacques to impound water for his lakes.

#### Interpretations

1. The Racepond area was originally an oremine similar to those tested in Check 12 (Features 1,2,3,4) - Phase 1.

2. The mine filled with ground and spring water and the banks were used as an ored washing area with water drawn from the pond and the adjacent creek.- Phase 2.

3. The ore washing pond was converted into a racepond with additional water tapped from a millpond dam area connected to the racepond by a raceway - Phase 3.

4. The capacity of the racepond was increased by building up the banks of the tailrace to twice their original height. This increase was to take care of the water supply needs for the maximum period of use - sometime after 1857 when the second Charcoal blast furnace (Isabella or Stack #2) was built.

5. The racepond falls into disuse. This was probably not much before 1903. Phase 4.

6. The racepond, millpond and headrace were revived by a real estate development scheme in the 1920's (Lanceolot Jacques) - Phase 5.

7. Oral history says that President Hoover and President Franklin Delano Roosevelt used the pond for catching mountain trout. At this time the pond was also used for raising goldfish a profitable business which expanded and continues to the present time elsewhere in the vicinity. The goldfish were removed and the pond stocked with government hatchery trout for the presidents - then replaced when their catch was completed. A small school of large (2 feet in length) carp goldfish are frequently seen in the remaining water of the pond. They are descendants of the first goldfish sent to stock the Whitehouse pool in Washington during the 1920's by Bill Renner.- Phase 6. (Orr and Orr, 1977, 45-47)

8. The pond again fell into disuse during the 1930's.- Phase 7.

9. About two-thirds of the original racepond was covered over in the construction of the existing U.S. Route #15 in 1960.- Phase 8.

#### Summary

The Race Pond site was investigated through 8 backhoe trenches and several tests, 10 GOW borings from surface to bedrock, and numerous interviews with oral history informants. The findings indicated 8 phases of change beginning with an iron ore mine indicated by fill debris in the borings from 18 to 40 feet below the surface. After mining activities were completed the hole filled with water and iron ore from nearby mines (Check 12, Feature 3 mine for example?) were washed in the resultant pond. Characteristic tell-tale deposits of clay (gray) and loam spotted the banks and shore areas of the pond and were clearly identified in trenches and tests. Sometime later the pond was converted into a racepond with water intake and tailrace connecting it to the Catloctin furnaces by a raceway. The excavation of the tailrace showed two level of raceway activity. The second level raised the raceway banks high on both sides to produce a channel that carried double the original load of water. This event was correlated with the development of the second blast furnace (Isabella, 1857) whose water wheel, directly connected to the pond by the raceway required the additional water. The racepond was in use until 1893 when Isabella was decommissioned and the water wheel became obsolete at Catloctin furnace. Post furnace activities included the use of the pond in connection with Lanceolot Jacques developments, and as a goldfish pond and presidential trout-fishing pond. It was used as a skating pond prior to being nearly completely covered by U.S. 15 in 1961.

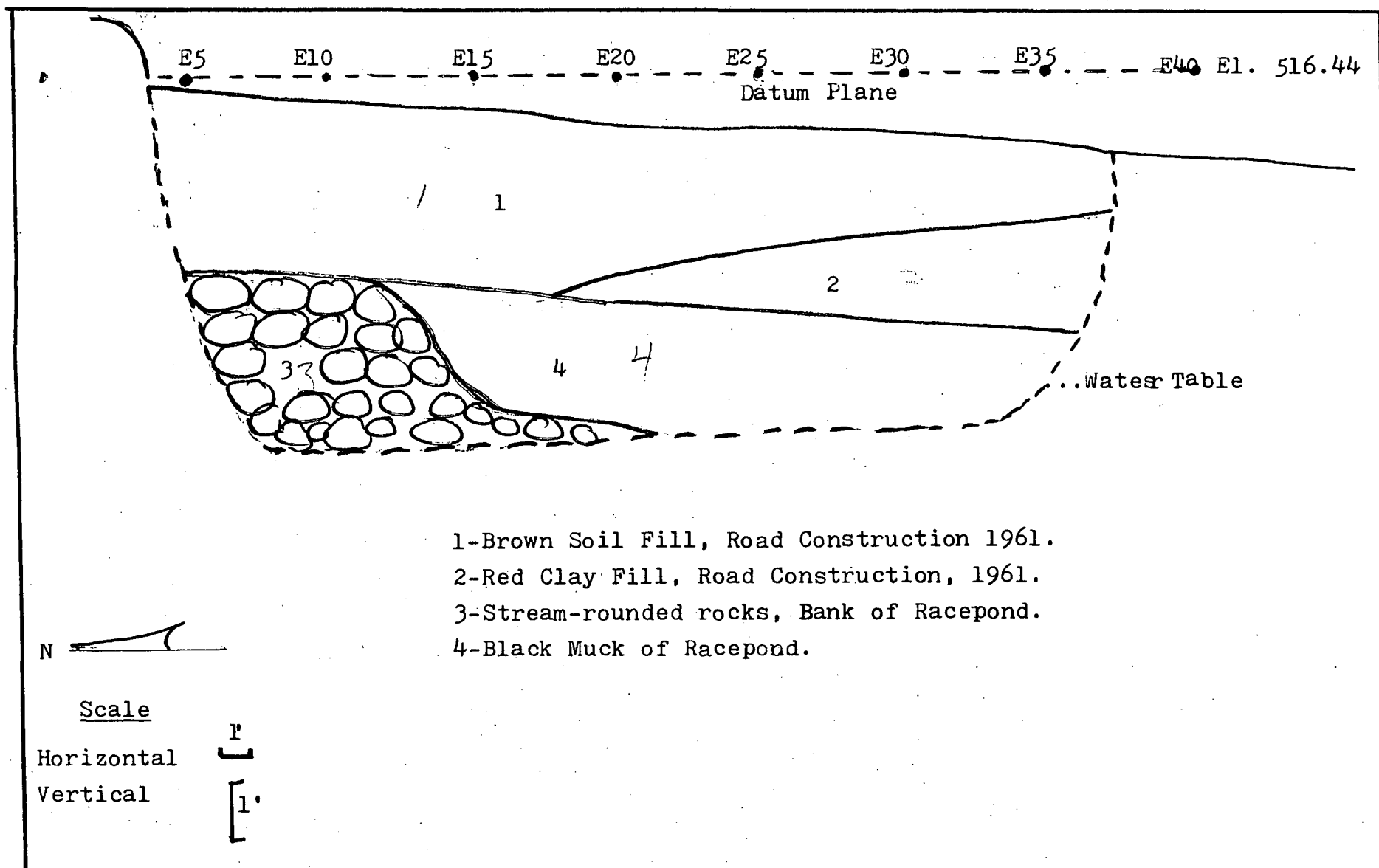


Fig. 23 Check 11, Trench 1, Racepond with U.S. Route 15  
 Fill overlay impact of 1961.

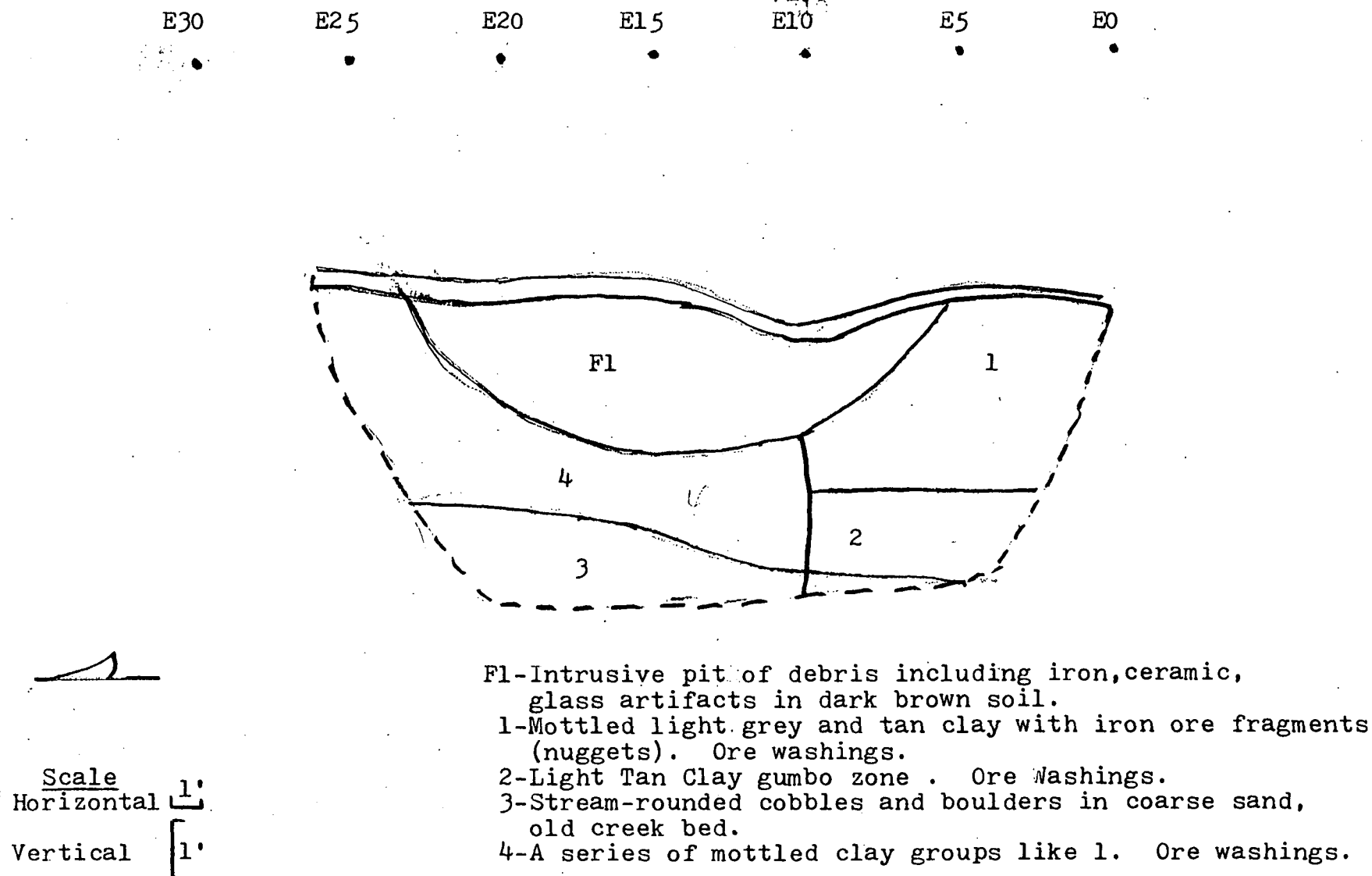


Fig.24 . Check 11, Trench 7. Trash Pit (Feature 1) with ore Washings zones.

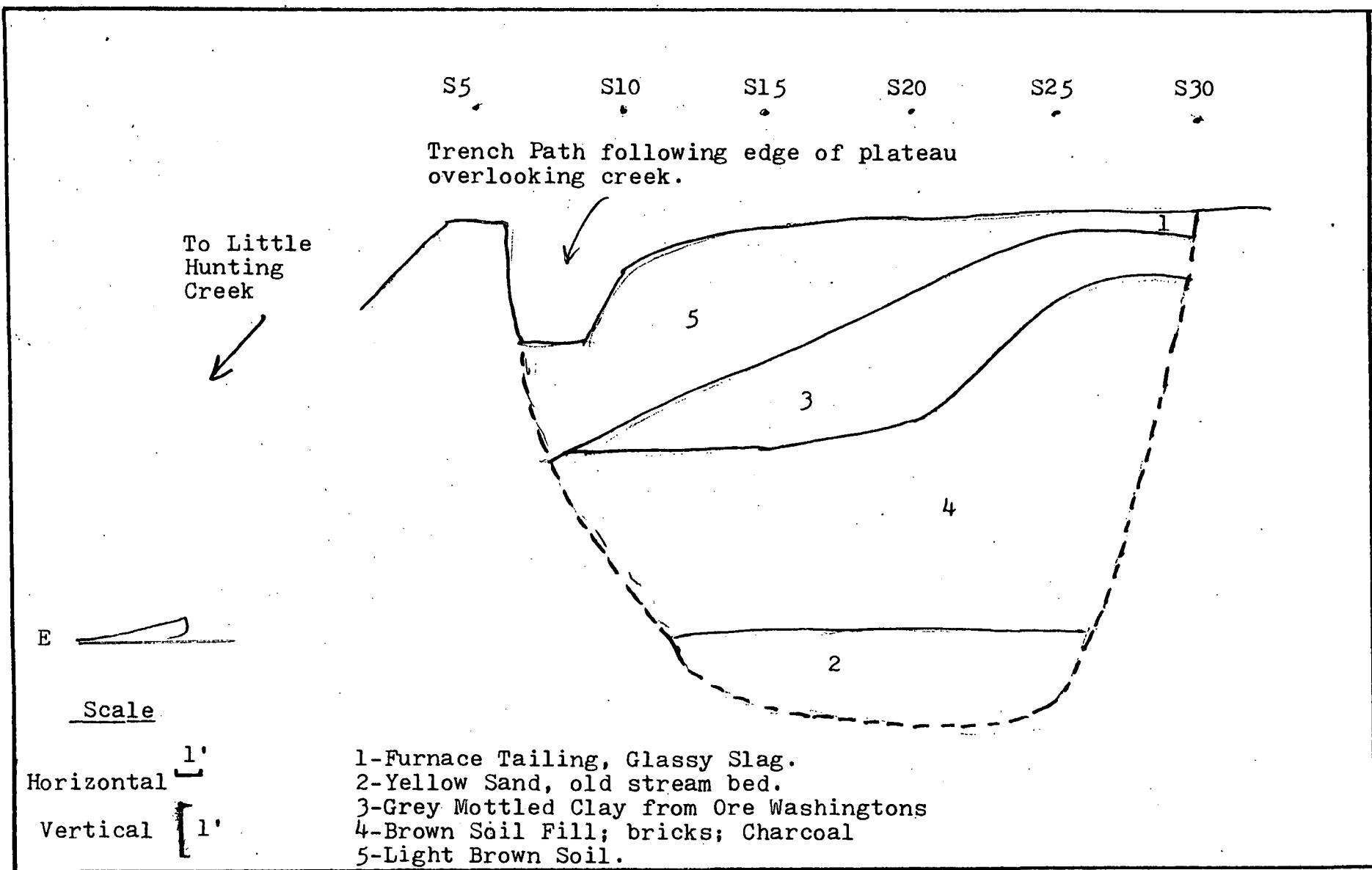


Fig. 25. Check 11, Trench 8, Debris and Iron Ore Washings surrounding Racepond Iron Ore Mine.

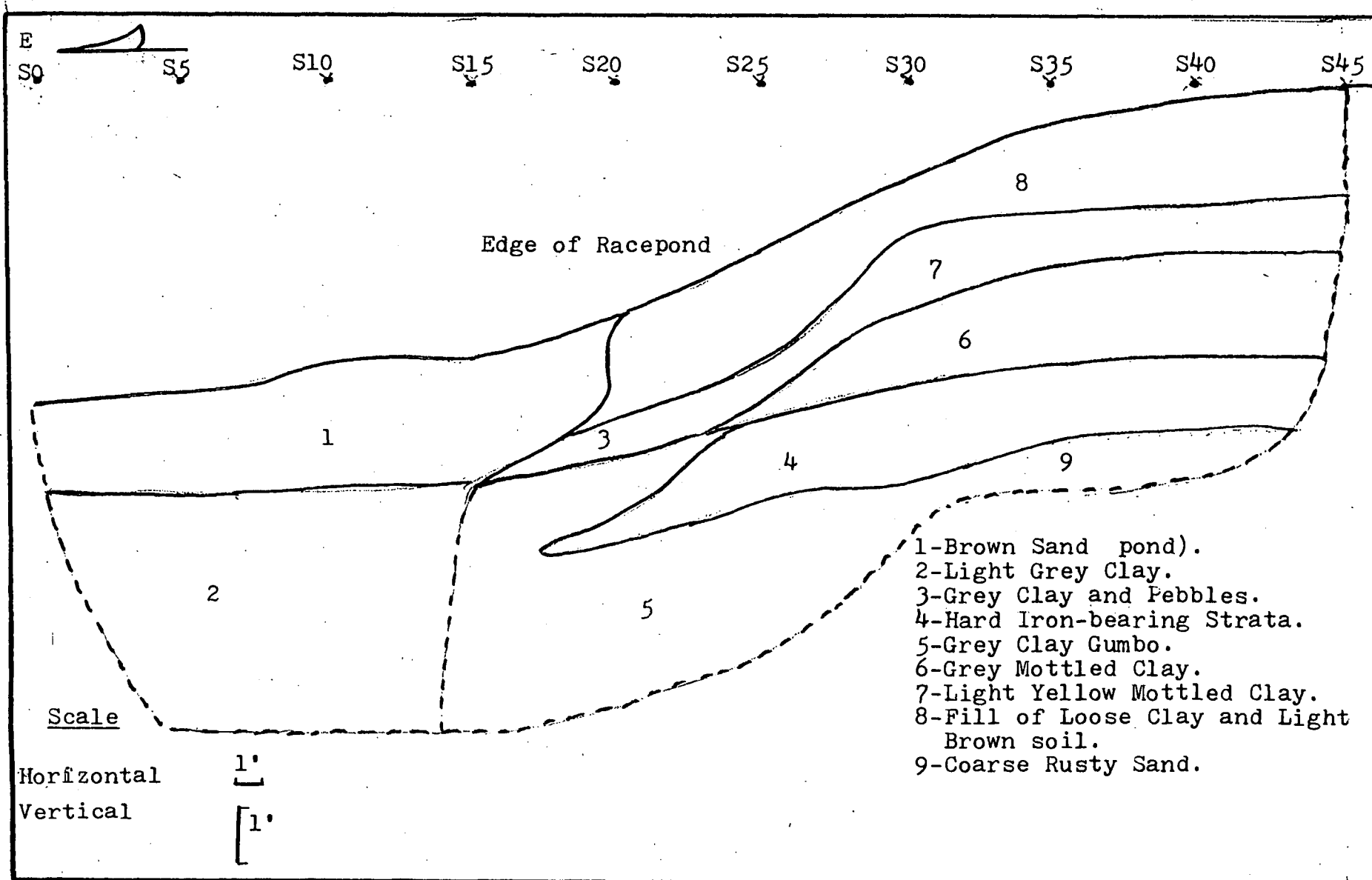


Fig. 26 Check 11, Trench 9. Strata 4,5,9-Iron Mine; Strata 2,3,6,7,8-Iron Ore Washings; Stratum 1-racepond.

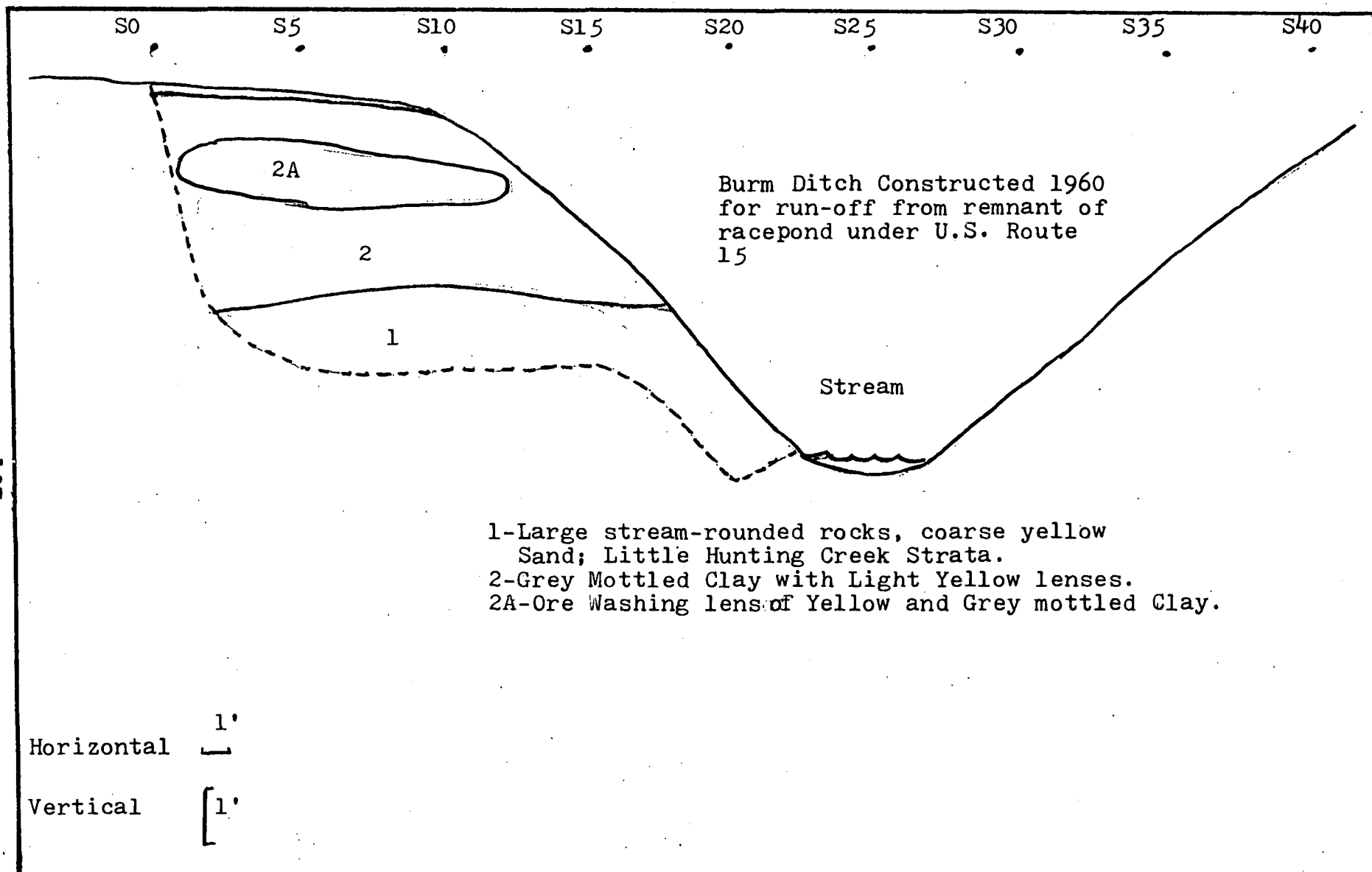


Fig. 27. Check 11, Trench 10. West edge of Debris and Ore Washing plateau at Racepond.

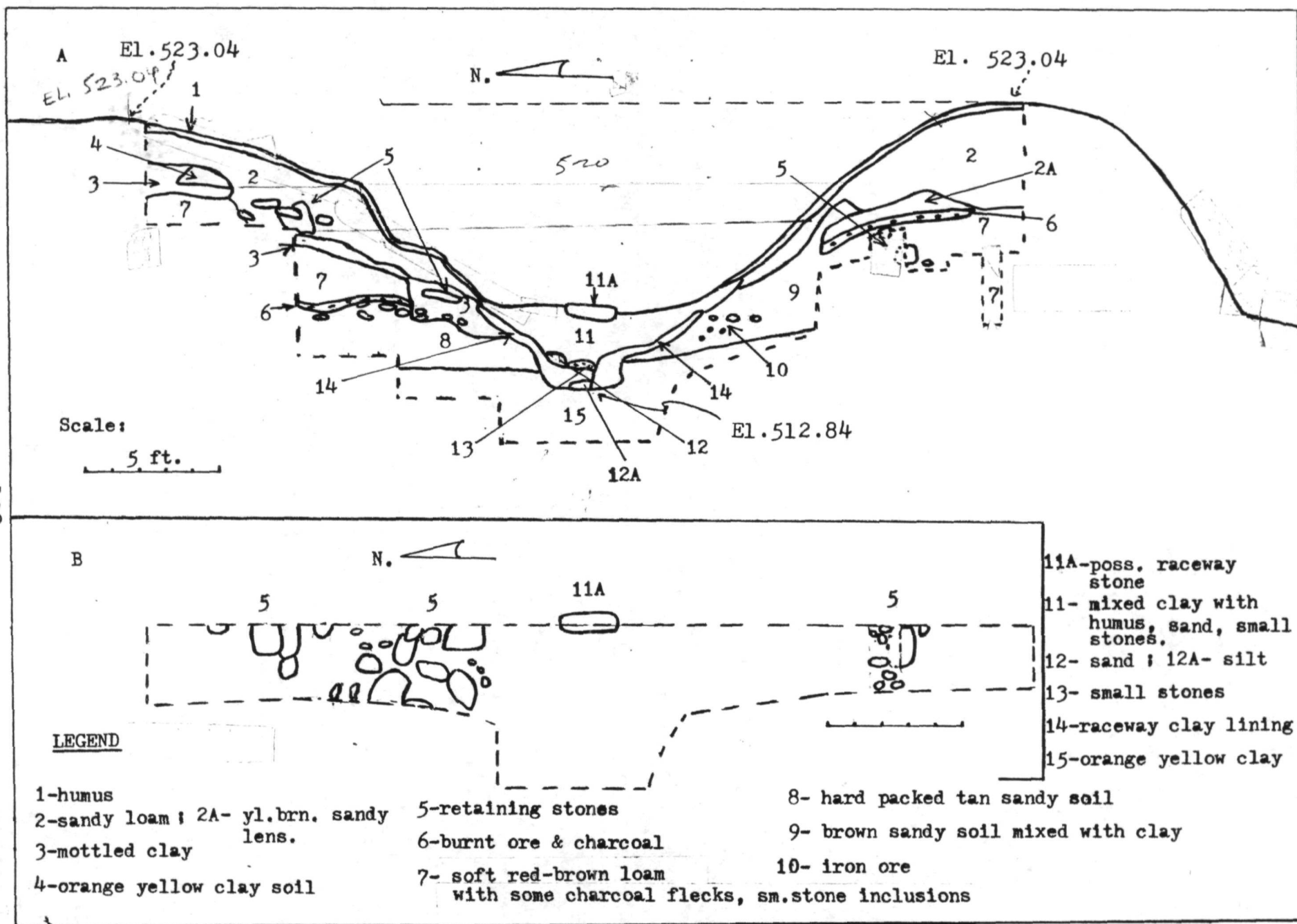


Fig.28. Check 12, Feature 5, Raceway. A. Profile, B. Ground Plan. Legend for A and B.

**CHECK 12: IRON ORE MINES AND CHARCOAL ROAD**  
**(18FR325)**

Check 12 includes three mines (Features 1, 2, and 4) and a Charcoal Road. Feature 5, a raceway which carried water from the Race Pond belongs with Check 11. Feature 3, another mine, is outside the area of Alignment 1 construction, (Figs.24 -37 )

**Research Design**

The purpose of the research was to learn as much as possible about the features within the construction area before further impaction. Feature 1 will lose 10 feet from the top strata of the mine. Features 2 and 4 are mines almost completely covered by the existing U.S. Route 15 but will lose a bit more of their sides. The Charcoal Road through which Route 15 plowed through will lose another 75 feet. The mines required excavation and/or borings to reveal the configuration of the open pit, now completely covered. In this process, Feature 1 offered the chance to study the manner in which the ore was extracted, as well as its placement in relationship to the other natural stratigraphy as was the case with the other two mines. Oral history depicts the manner in which the charcoal-bearing wagons would come down the fanned-out charcoal trails to the main Charcoal Road; ring a bell in a tall sycamore to summon the charcoal weigher; then, depositing their charcoal faggots in the Charcoal House at the Furnace and return to their kilns along the same route - trailing charcoal dust. Backhoe-cut trenches were cut into the terrace on which the road ran, and along with careful hand excavation of the road surfaces unfolded clues supporting the image of the events of the past which still survived as memories.

Dr. John Fauth, geological consultant, reports on the inter-relationship between geological and archaeological aspects of Check 12 features as revealed by his collaborations with the archaeological excavations and analyses of the SHA Bureau of Soils and Foundations borings (Appendix A).

## The 1979 Excavations

### The Iron Ore Mines.

Feature 1, Box Mine. The original test trenches (Orr and Son, August, 1977, pp. 50-59) were enlarged by backhoe revealing undisturbed natural strata on the sides of the box-like depression. Approximately ten feet of soil fill (clay and loam with fragments of iron ore) resulting from the mining operations occupied the box mine. The base of the mine excavations was fully ten feet below the present surface where a yellow soil marked the end of a layer of iron ore which was being mined. Six split rails sharpened and used as stakes were found at the bottom level along with a six-foot long squared beam containing large square spikes of iron and showing evidence of rope-wear in the middle. The fill layers were alternately thick bands of grey clay loosely consolidated and brown soil. The top layer of the fill was composed of numerous bands of soil and clay in a zone some 6-12 inches in thickness. These trenches are designated Feature 1A. (Fig. 29)

Feature 1B is the squared banks of the mine at the west end of the pit where the rising side of the mountain terminated the mining operation. An L-shaped trench was cut here to a depth of 5 feet with a backhoe. Natural strata consisting of gray clay and brown soil were encountered in the sides, and the loose fill of these strata found at the base of the excavation. A number of test pits were placed in the area between Feature 1A and 1B by shovel. In each case fill similar to that described for the upper layer of Feature 1A was found. These strata dug to a depth of 3 feet were screened ( $\frac{1}{4}$  inch mesh). No artifacts were found but quantities of cinders, typical of furnace tailing occurred. (Appendix A, Figs. 4, 5, 6)

Feature 2. Mine. Two backhoe trenches were cut into the banks of this mine, the greater part of which is covered by the existing Route 15. Trench 1, placed in a hillock adjacent to the Catoctin Hollow road, was cut with a backhoe for a distance of 25 feet. Natural strata including a thick zone of iron-bearing concretions were encountered. The concretions were considered to contain a sufficiently large concentration of iron to have been mined. The base of cut revealed slabs of concrete extending to an unknown depth. Trench 2 was a similar cut placed in a mound some 15 feet high and 150 feet long occupying the center of the mine surface. No iron ore or cultural features were found in its brown loam strata. Twelve borings drilled into the mine showed iron ore deposits still in position in a relatively shallow mine (Appendix A, Figs. 7, 8, 9, 10). (Fig. 29)

Feature 4. Mine. This mine, almost completely covered by Route 15, was revealed by an "as is" north-south profile mapped prior to the construction of the road (SHA Bureau of Design Map, 3/62; Sheet 17 of 31). Here a depression is seen 350 feet long and 30 feet deep. Attempts to use a backhoe to explore the mine strata were thwarted due to the steepness of the road embankments against the sides of the mine. A trench was cut in the vertical face of the Charcoal Road site at the north end of the mine, but no iron-ore was seen. A surface search by Dr. Fauth, our geologist, revealed iron ore nuggets at various levels of the mine. Two iron rails were found, one twisted badly, at the juncture of the mine wall and the road embankment. Seven borings revealed a deep ore mine below the present water table (Appendix A, Fig. 11). (Fig. 38, 30)

Interpretations. The mines Features 2 and 4 are probably those described by geologist Singewald following his 1911 examination of the Catoclin Iron Industry then almost defunct. (Singewald, 1911). A third mine was described in the area of these two. That mine is believed to be the Big Ore Bank now a pond and outside the area of Alignment 1 construction (Orr and Son, August 1977, Check 13, Fig. 68).

Feature 1, box mine, represented an exploration for iron ore made from Feature 2, mine. This mine was dug following the iron ore strata and avoiding sterile zones such as the large island of sterile strata explored by Trench 2 Feature 2. A "rabbit warren" pattern of mine excavation resulted. This is seen also in the Check 11, Race Pond, area where another "island" occurred as a result of a limestone outcrop. Feature 3, mine, not investigated since it is outside of construction area, represented a continuation of Feature 2 mine probably underneath the raceway which was carried by a wooden aquaduct at this point.

A model for the mining of open pits in the period represented by Feature 2 mine, and by inference Feature 3 and the race pond mine, is suggested by the data of Feature 1, box mine when considered with the presumed picture of a later period mine- the Big Ore Bank mine (Contract Archaeology, Inc. 1971, Plate 4A). This is visualized as a Middle Period mine lacking steam equipment and iron rails for the ore carts: (see sketch, Appendix A, Fig. 12)

1. Dig a squared face 40-50 feet wide and half as deep.

2. Proceed to dig forward by throwing non-ore soil to the rear and side and ore fragments into ore carts. Ore carts probably on sleds with furnace tailings used to give prepared surface. Because of softness of clay/loam soil sleds are visualized.

3. A wide step platform gradually lowered to base of mine (e.g. base of iron ore vein) results from this process. The sides are shorn up by the use of squared timbers held in tier positions by perpendicular split-rail stakes.

4. The total face is kept parallel and on the same plane by alternately digging adjacent 50x25 foot sections.

5. The vein of iron-ore is followed with sterile areas avoided. The digging stops when the overburden, as in a steeply rising mountain side is encountered, becomes too great, or the vein goes too deeply into the ground water. Ground water is kept drained by ditches, but excavation could not proceed as deeply as it later did with steam pumps.

Feature 4 mine is considered to belong to the later complex of mines including the Big Ore Bank and Fitzhugh-Kunkel mine because of its greater depth and presence of iron rails.

An idea of the amount of iron ore in Feature 1, box mine is gained by comparing the amount of fill left in the "box". This amounts to one-third to one-half of the total, original volume. Much of the ore taken from the mine contained soil which was washed off at the washer pond at Check 11, Race Pond. A comparison of the iron-bearing strata to non-iron bearing suggests that about one-fourth of the total soil contained iron ore. (Orr and Son, August 1977, Fig. 19)

#### Feature 6, The Charcoal Road.

Trench 1. A backhoe trench was cut directly across the road revealing a thick zone of grey slag which covered the north side of the upper terrace. A layer of gravel was found just under the surface. The gravel formed a strip some 15 feet wide which contained ruts, extending 6-10" into the ground and filled with gravel. The graveled strip overlay a thick band of powdered charcoal which was resting on a band of red gravel from furnace tailings. It had a set of ruts of its own about wagon axle distance apart. These features in turn rested on a grey clay fill which resembled the soil resulting from ore washings. A thin zone of green slag intervened between the grey slag mantle and the fill. (See Fig. 33 ).

Several unrefined waste iron pieces and a possible brake handle, and an iron bar, possibly an ancony used as a transportable form of pre-wrought iron, came from the green slag zone.

A small midden at the grid west end of Trench 1, to the west of the charcoal feature extended to about 18" below the surface in mixed clay soils with the majority of material being of a domestic nature (beer and milk bottles of amber and clear glass, tin cans, etc.) of 20th century origin.

Trench 2. A trench similar to Trench 1 above was cut into a terrace located approximately 7 feet below the upper terrace and directly to the south. The trench contained three charcoal features similar to that described in Trench 1. Each was similarly underpinned by washer soil debris. Two, located on the terrace proper were about 12 feet in width. The third feature was located on the upper terrace. All rested on the same kind of fill. A wagon spring came from the charcoal of the charcoal feature furthest grid west on the edge of the slip of the lower terrace. (See Fig. 35)

Trench 3. A backhoe cut produced a nearly vertical trench at the edge of the terrace and next to Trench 1. It was excavated to a distance of about 12 vertical feet to the floor of Feature 4, iron mine. A thick mantle of charcoal draped over the side of the terrace. The grey clay fill proceeded to a light yellow subsoil near the base of the cut.

The same type of midden material of recent origin was found along the talus slope of the Charcoal Road mound and at the base where disturbed mixed clay soils down to 28" below surface revealed modern milk and scotch whiskey bottles and an electrical insulator pipe. The depth of this material that was probably a surface dump could be related to earth moving during the construction of nearby U.S. Route 15 (1960).

Grid 1. A 5 foot grid was placed over the gravel and charcoal areas at the surface of the upper terrace and excavated by hand. A brass fountain pen and fragments of bottle glass came from the gravel area. An aluminum key was found above the gravel. Two wide ruts were discovered in the charcoal layer. In the rut fills, consisting mainly of clay and grey slag, were found several clear bottle fragments of the 20th century along with a few machine cut nails. This indicated that the fill material was a late addition. Several iron droplets and small iron waste fragments were found on top of the charcoal layer's surface, but no artifacts other than a few amber and clear glass fragments mixed in with grey-hard, scattered slag, were found on this surface. (Fig. 34)

Test Pits and Post Holes. A series of test pits and postholes were put into the upper terrace surface for a distance of several feet. In Test Pit 5 several droplets of unrefined iron along with several machine cut nails were found in the base of the

charcoal layer as it rested on clay fill 10-12" below surface. The test borings revealed only a few clear bottle fragments and a small copper wire 0-6" below surface - recent material. Alternate layers of charcoal, mottled clay and a layer (2-3" thick) of coarse red sandy soil were found in all but Test Pit 4. (Fig. 36 )

Observations. On the west side of U.S. Route 15 some 500 feet up the mountain four roads or trails were found ranging in size from 10 to 12 feet in width and a few feet deep. The trails appear to converge on a line made by the extension of the charcoal road.

#### Interpretations.

1. The upper terrace, measuring 50 feet wide and 8-10 feet in thickness, was built of ore washings for the purpose of conveying charcoal in wagons from the charcoal hearths on the mountain to the furnace of Stack #1, and later Stack #2, both located directly to the East.

2. The converging trails on the mountain led to charcoal hearths where colliers rendered wood cut from the forest into the fuel used. (see charcoal trails exhibits in the Catoctin Mountain National Park)

3. The charcoal roads\* were marked by red furnace gravel mantles put down to support the wagon wheels. The roads and adjacent areas were covered with charcoal dust which came from the emptied wagons as they returned to the mountain hearths or the charcoal was intentionally placed as good road bed material. (\*upper terrace) Rut space=6'.

4. The mountain trails converging on a projection of the Charcoal Road probably led into successively smaller trails terminating at the charcoal hearth areas.

5. As the demand for charcoal grew with the expansion of the iron industry at Catoctin Furnace a second terrace to the south of the first was added as seen by the 1-2 foot thick mantle of red sandy soil on the grid west slope. This was probably originally used to prevent erosion. This mantle is seen underlying the extension of the lower slope. This terrace contained two charcoal roads corresponding to the two roads found on the upper terrace - one for coming and one for going to the charcoal depository found by Little at the edge of the retaining wall terrace (Contract A. chaeology, 1971, folded map). The upper terrace was probably constructed in the latter part of the 18th century, and the lower road in the middle of the 19th century when the construction of Stack #2, the other charcoal blast furnace, and the Charcoal House depository took place, along with the retaining wall.

6. The charcoal road was probably in use as such until the late 19th century. The last charcoal furnace (Stack #2) was discontinued in 1893. An exposed section of road on the upper terrace

revealed the use of scattered, hard grey slag on the charcoal road surface. This slag is believed to have come from the Stack #3 furnace which burned anthracite coke.

7. A "dirt and stone public road" partly coinciding with the charcoal road was in use in the early 1960's, the prototype of the present Catoctin Hollow road (SHA Bureau of Design Map, as built revisions 2/17/64, Sheet 18A of 31). Part of this road with its early 20th century artifacts was excavated. It is believed that the grey slag veneer noted above and the grey slag buttressing on the north side of this road came from Stack #3. The stone gravel of the road is known as "crusher-run" gravel and dates back to the late 1800's. An inner layer of green slag, probably from Stack 2, could have been an earlier shoulder for the charcoal road. \*

### Conclusions

It is believed that the excavations, borings, and observations of this site satisfy the data requirements for the mitigation of the impacted sites. It must be stressed, however, that additional oral history and land records data should be sought to substantiate the interpretations of these data. During the incising impact of this site an on-site archaeologist is recommended for additional observations as the site is destroyed and for recovery of additional large artifacts unearthed in the road construction.

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\*The midden material found alongside the top terrace road consisted of common roadside dump debris for the 20th century.

Cultural Material from Charcoal Road, Check 12, Feature 6

Test Pit 3

0-6" b.s. 1 clear bottle fragment.

Test Pit 5

10 $\frac{1}{2}$ -12 $\frac{1}{2}$ " b.s. (base of charcoal layer and mottled clay fill):  
2 iron droplets, 1 with grey slag attached.  
2 machine cut nails.

Test Boring #1

0-6" b.s. 1 clear bottle fragment (possibly milk).

Test Boring #2

0-6" b.s. 1 small copper wire.

Trench 1, West End

0-6" b.s. 1 clear bottle glass (milk).  
1 amber glass beer bottle, seams to top of lip, 20th C.  
1 hand painted clear bottle fragment.  
1 large can top.  
6 small tin fragments.  
1 metal jam jar top.  
1 tin can.  
1 paint can top.  
1 shoe sole.  
1 leather shoe heel.  
6-12" b.s. 4 clear bottle glass  
5 Amber glass. 2 bottle bases with raised letters "Clorox"  
1 metal piston ring.  
1 spark plug.  
1 metal jar top with writing "try our ideal brand applesauce".  
1 white glass screw type jar fragment.  
1 thin tin fragment.  
1 small bottle threaded neck. Indented base with raised lettering "Nestle, made in U.S.A."  
1 small clear glass bottle, threaded lip, seams to lip with raised number "9".  
2 clear glass hexagonal-shaped fragments.  
1 multisided glass fragment.  
7 sherds whiteware (from plate) with wavy edges.

Cultural Material from Charcoal Road (contd.)

Trench 1, West End (continued)

- 7-10" b.s. 2 matching thick green bottle glass with raised letters  
"ECT & O".  
1 thin tin sheet, small fragment.  
12-18" b.s. 1 clear bottle fragment.

Trench 1, East end.

- 0-6" b.s. 3 iron droplets, unrefined iron; 1 with slag attached.  
12-18" b.s. 1 large irregular shaped flat iron piece 7 5/8" x 2 1/2-3"  
wide, c. 5/16" thick.

Trench 2, West end

- Surface. 1 thick (1/8" clear bottle fragment.  
12-18" b.s. 1 long flat iron bar covered in charcoal dust from  
charcoal layer, possibly wagon spring, 20 1/2 x c.2" x  
c. 3/4" thick.

Trench 3 base

- Surface 1 gilt edged stippled transfer print sherd, colonial scene.  
4 milk bottles (recent) 2 quarts, 2 pints.  
1 amber glass medicine bottle (seam to lip)  
1 1/2 saucer plate, highly fired porcelain, c. 20th C.  
0-18" b.s. 1 beer can  
1 clear glass bottle (seam to lip)  
1 amber glass fragment.  
1 blue "Bromo Seltzer" bottle.  
1 large bent out body part.  
1 clear glass bulbous bottle neck, threaded lip, seam  
to top of lip.  
3 large stoneware sherds of large crock.  
1 China sherd (white).  
24-28" b.s. 2 metal fragments not identified.  
1 turquoise glass fragment (flat).  
1 "lint liquid" milk bottle  
1 large amber glass bottle (scotch) "Fed. law prohibits  
sale or re-use of this bottle"; raised letters  
"Ballantine & Son". Aluminum twist off cap.  
1 light greenish tinge bottle glass with raised letters  
"ECT".  
1 large clear glass jar body fragment with raised letters  
"ATLA TRONG SHO MASO".  
1 clear glass lid (3/16" thick) with raised letters  
"ATLAS EDJ SEAL"  
1 small clay pipe - possibly for electrical insulation  
(bulbous end)  
31" b.s. 1 tall amber bottle, seam to top, post 1903.

Cultural Material from Charcoal Road (Contd.)

Grid #1, N50E65

Surface        1 paint can top.  
              1 plastic hair berret.

Grid #1, N50E70

Surface        3 clear bottle fragments.  
Layer 1        1 metal bottle cap  
(thin humus) 1 clear bottle fragment  
Rut fill       2 small clear bottle fragments  
(clay & slag) 2 green painted wood slivers  
              1  $\frac{1}{4}$ " thick cut nail, no head

Grid #1, N50E75

Layer 2 (soil 1 "Yale" aluminum key.  
and slag)    1 iron droplet  
              1 cycle spoke center.  
              1 amber bottle fragment.

Layer 3  
(Crusher  
run)  
Top  
Middle  
Bottom        1 iron droplet, slag adhering.  
              1 wire nail.

Rut fill       2 clear bottle fragments.  
(clay &        2 green painted wood slivers.  
slag)        1  $\frac{1}{4}$ " thick machine cut nail (no head)

Layer 4       1 large square headed screw  
Charcoal  
Road, top  
layer.

Grid #1, N50E85

Layer 1       1 green cloudy bottle fragment.  
              1 wire, clothes pin.

Layer 2       11 amber bottle fragments  
              1 amber bottle base with raised letters

Grid #1, N55E75

Surface       1 fire burnt clay "plug" fragment  
              1 iron wire piece.  
              1 tin foil piece.

Cultural Material from Charcoal Road (Contd.)

Grid #1, N55E75 (contd.)

Layer 2        1 brass pen sheath  
              1 fire reddened clay "plug" (?) fragment.

Layer 4        1  $\frac{1}{4}$ " long machine cut nail.  
Rut Fill

Grid #1, N55E80

Layer 2        1 iron droplet  
Layer 3A  
(1a under      1 thick wrought iron nail.  
crusher        1 possible wire nail.  
run)  
Charcoal Rd.   1 amber bottle fragment  
Layer           1 long iron fragment (unidentified)  
Top

Grid #1, N55E85

Layer 3A       4 iron droplets.  
(1A under  
Crusher  
run)

Rut fill       1 large machine cut nail.

Charcoal Rd. 1 iron droplet.

Layer  
Top

Grid #1, N55E90

Layer 3        1 Machine cut nail (deteriorated)

Grid #1, Trench 1

Charcoal Rd. 1 clear bottle fragment  
layer        1 amber bottle fragment.  
top

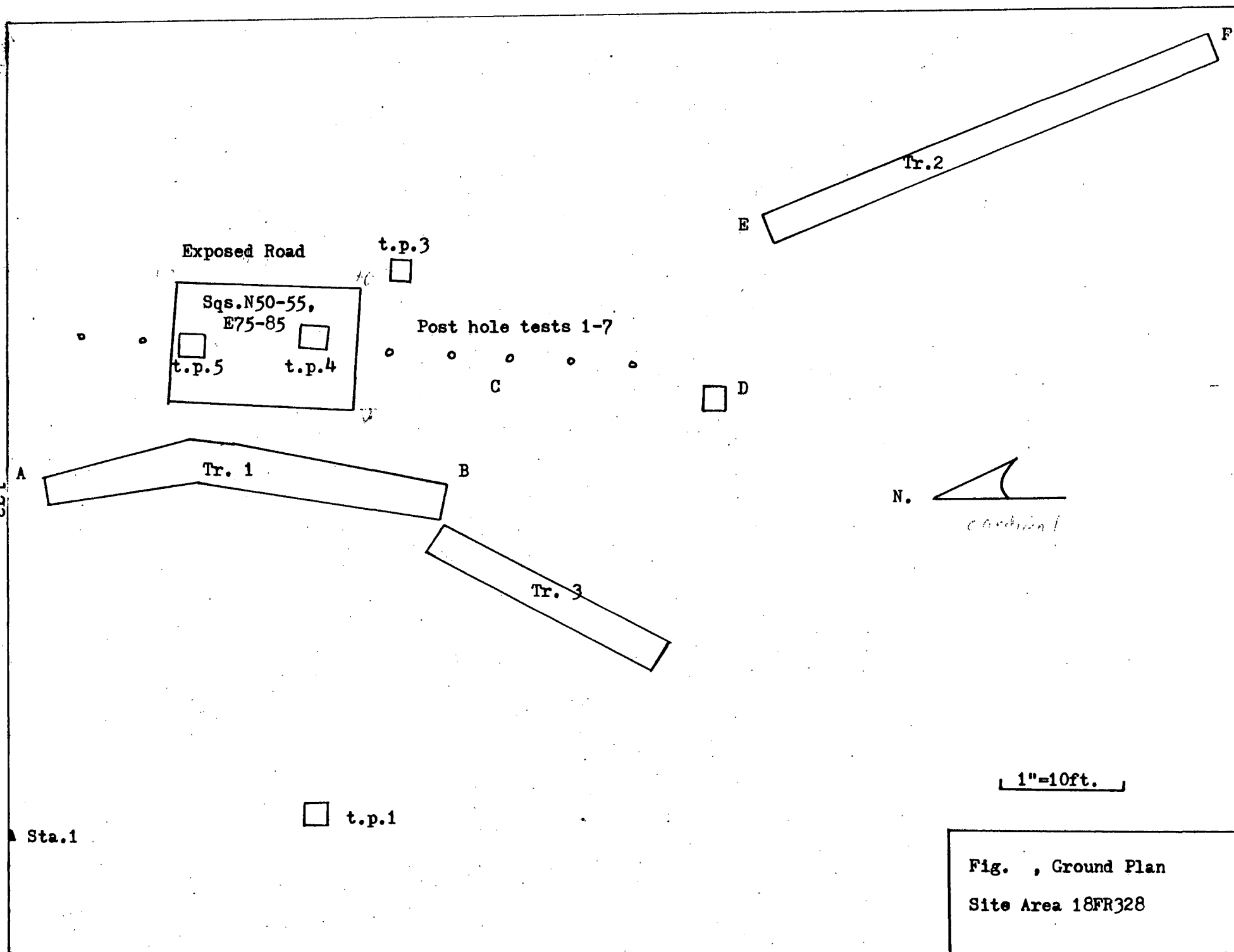


Fig. 32. Ground Plan of Check 12, Feature 6, Charcoal Road.

Fig. , Ground Plan  
Site Area 18FR328



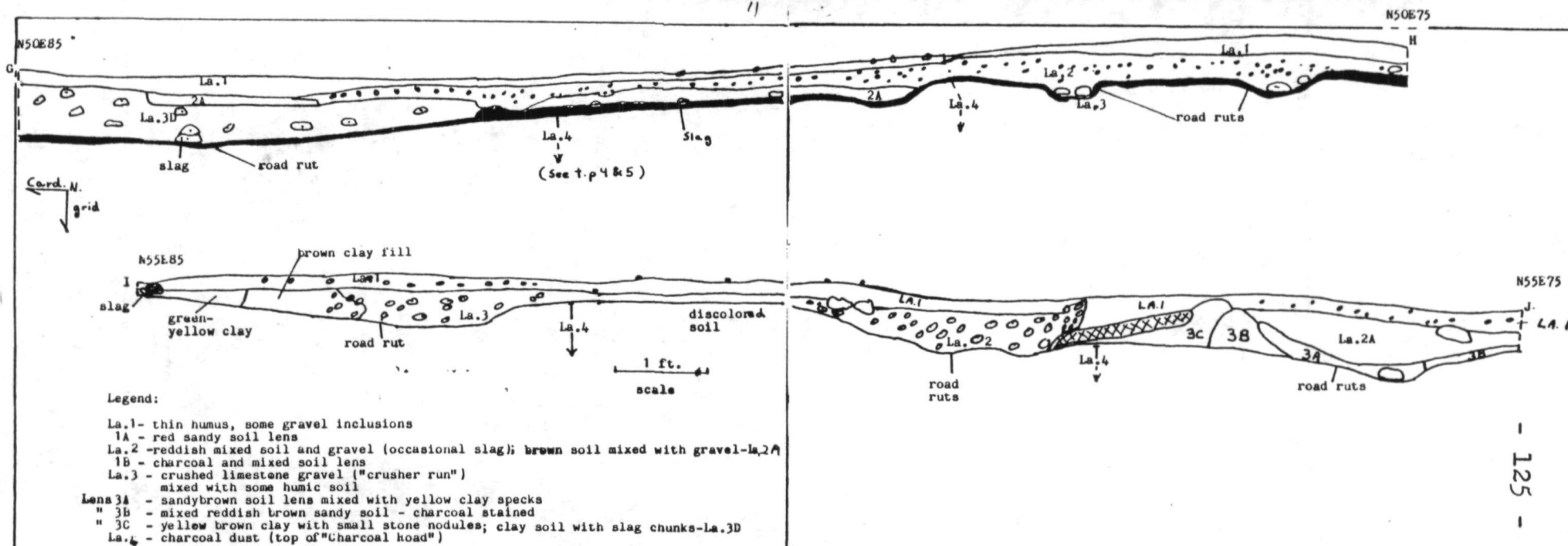


Fig.: Profiles of Grid #1, Check 12, Feature 6.

Figure 34

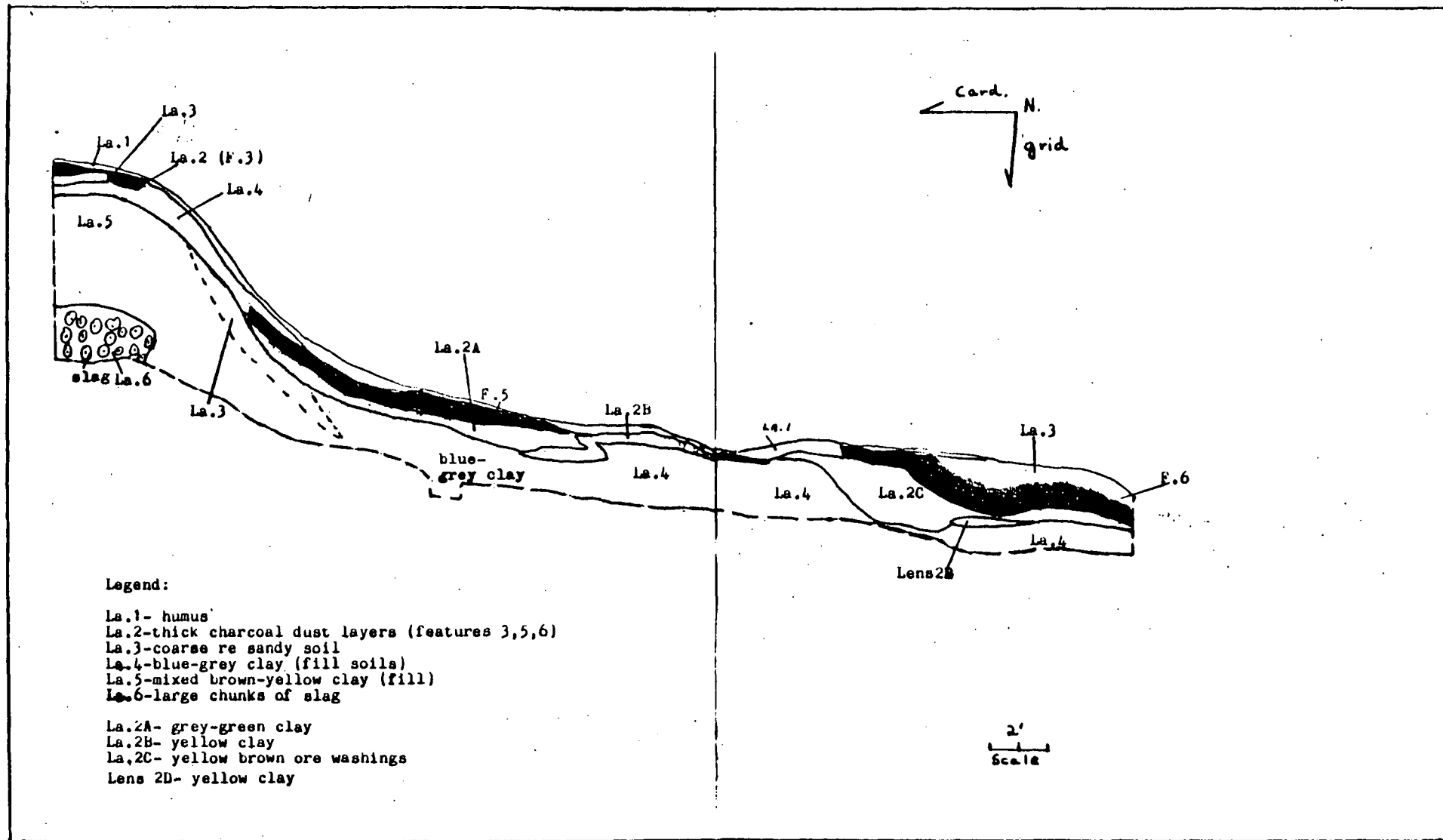

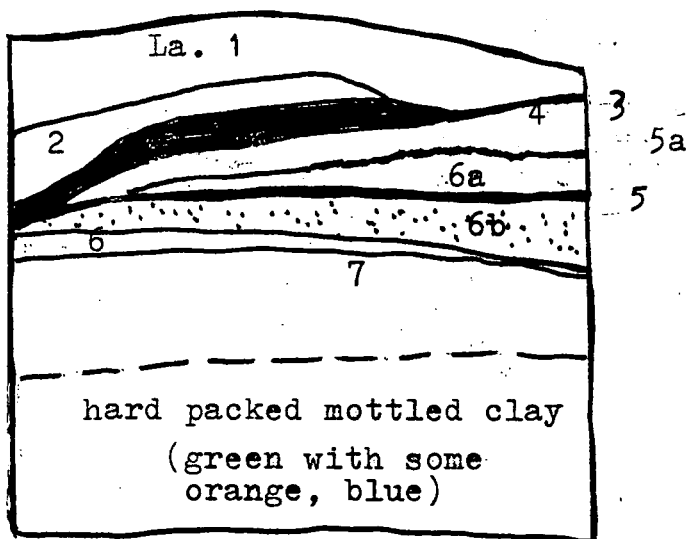


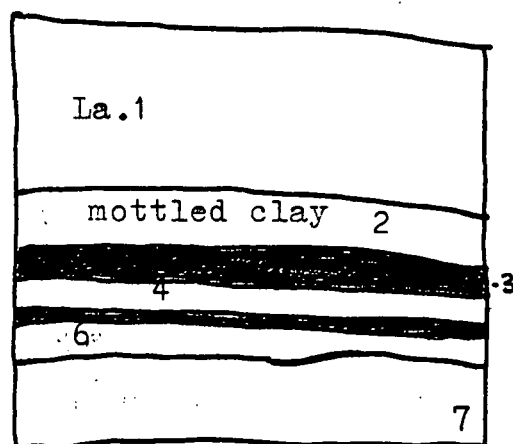
Fig. 35. Grid South Profile of Trench 2, Check 12,  
Feature 6.  
- 85 -

Figure 35.

N.   
grid

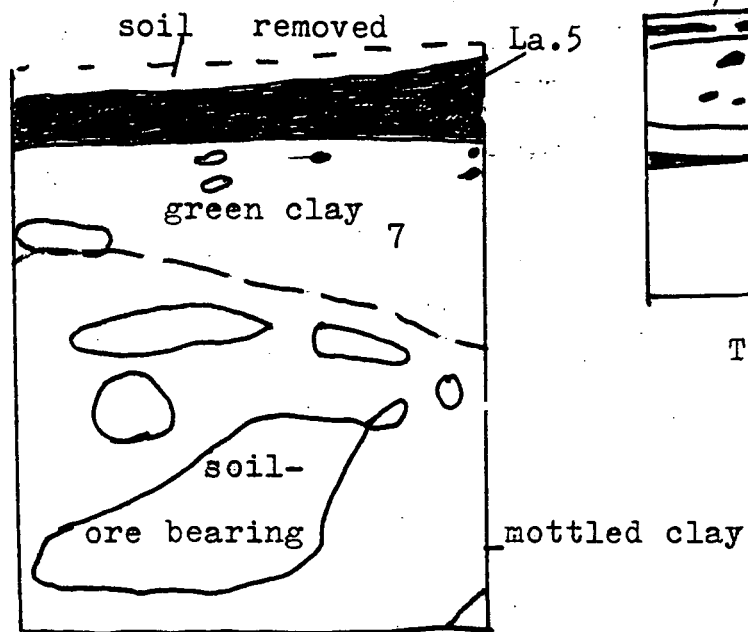


Test pit 2, west profile.



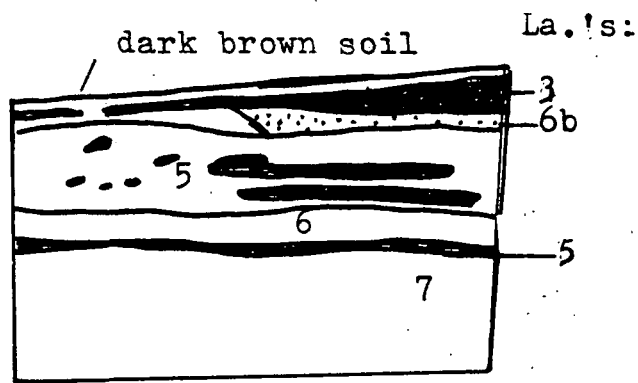
Test pit 3, west profile.

1 ft.  
scale



Test pit 4, west profile.

(note: all west locations are  
grid west)



Test pit 5, west profile.

#### Legend:

- La.1- humus mixed with charcoal
- La.2- mottled clay (green)
- La.3- charcoal dust
- La.4- mottled clay
- La.5-5a- charcoal dust
- La.6- coarse red sandy soil (also La.6a)
- La.6b- sandy soil
- La.7 - mottled clay (yellow-green mix)

Fig. 36. Profiles of Test Pits 2,3,4,5, Check 12,  
Feature 6.

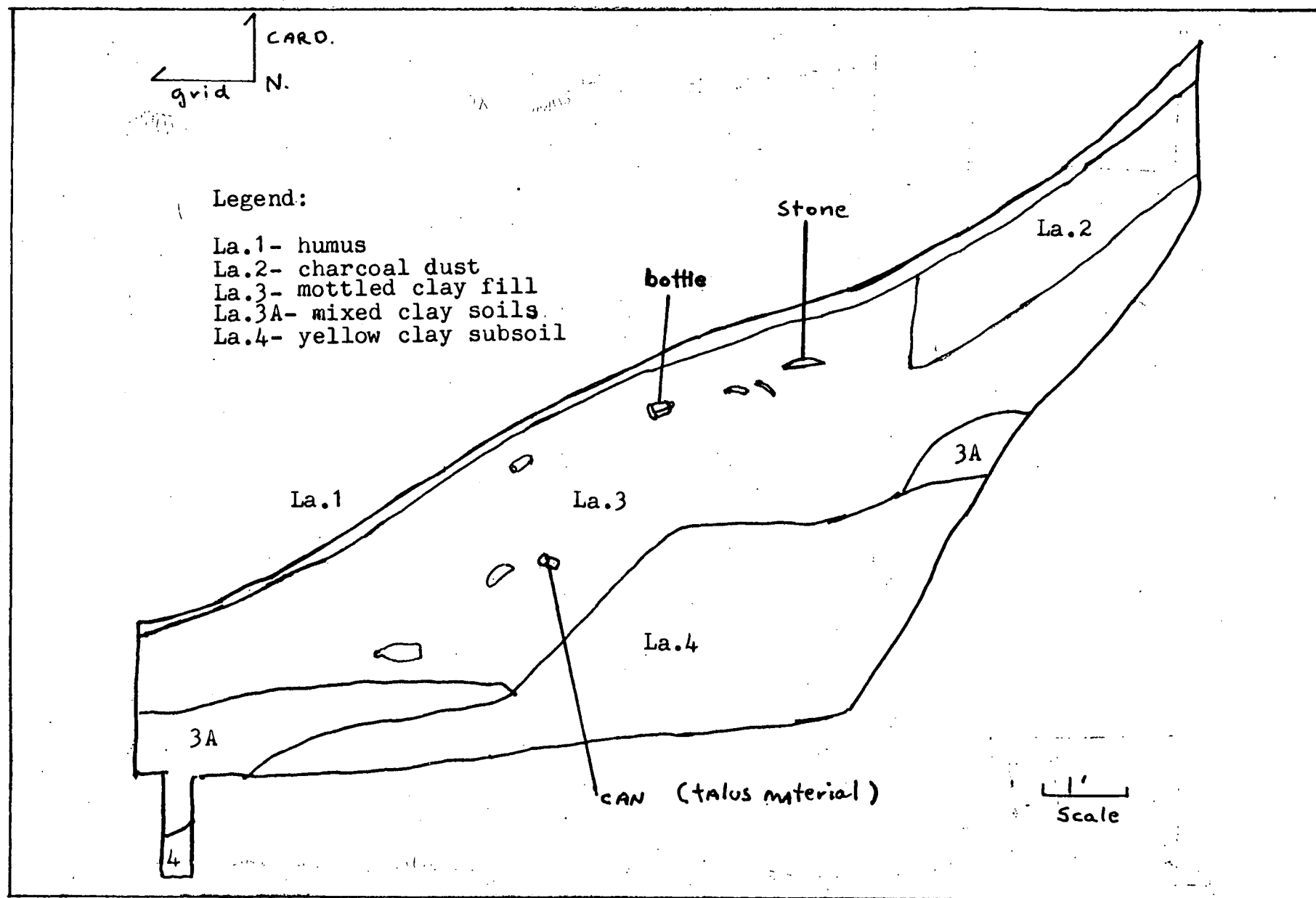


Fig. 37 Profile (Grid East) of Trench 3, Check 4, Feature 6.

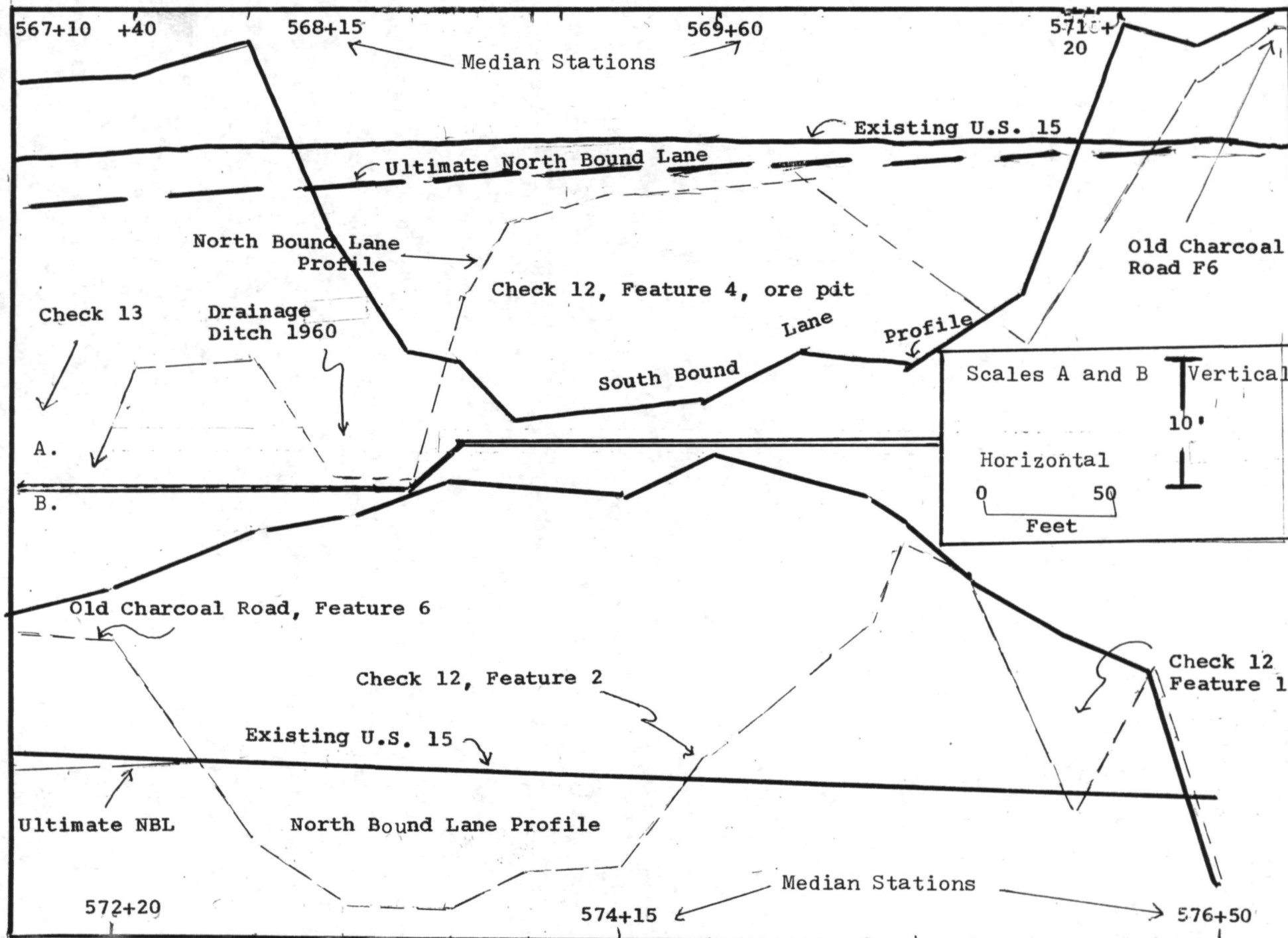


Fig. 38 North-south Impact Profiles Sta. 567+10 to 576+50 (A and B) showing check 12, Features 2 and 4, and Feature 6. (SHA As-Built Map Sheet 17)

CHECK 15. ORE RAILROAD  
(18FR329)

The original Check 15 of the intensive survey included most of the washer pond and ramp (Orr and Son, 1977, pp.60-73). When it was required to bring the Alignment 1 nearer to the existing Route 15 in the area of Check 15 only a small part of the original check area remained within the area of construction for dualization. The surviving area measuring some 250 by 25 feet, contained the outlet stream from the flooded Big Ore Bank mine (Check 13), a portion of the ore railroad area, and an abandoned ore cart lying on its side in the stream. The following is from the intensive survey.

Background (Fig. 5, 41, 42)

The Big Ore Bank, Check 13. Interviewee H was born in 1907, after the Big Ore Bank had shut down in the early 1900's, but people talked about it for years. He got the true story of the shut-down from Harry Fraley when he was in his 80's in 1940. Fraley worked in the big pit as a boy. The story was that George Holt, the night pumper, was disgusted. They say he hadn't been paid well. He just stopped pumping one night "on a Sunday evening". The two steam pumps were vital to keep the ground water down. The pit just filled up. The other mine workers were behind this move. They stopped work because of the poor company finances. "They were disgusted with their low pay". Everyone seemed to realize that it was too expensive to import coal fuel("coke") to keep the blast furnaces going. Somehow, the old charcoal fuel procured in abundance on Catoctin Mountain, and correspondingly cheap, was no longer good enough.

The pit was about 90 feet deep on the up-hill side, and 37 feet deep on the east side. It had two levels, the bottom and a terrace about half up. The ore was moved in ore carts and the rails in the pond are still there. Those outside of the pit were taken up and sold. The workers left their picks and shovels, ore carts, other tools - "everything was left down there".

William Renner has a picture of a deep mine which he says was taken by his father in 1885 at the Big Ore Bank (Contract Archaeology, Inc. 1971, Plate 4A). A face (probably facing the furnaces from uphill) shows 6 "bunker" areas with a slot about 3 feet wide through which the ore was sent into ore carts pulled by mules over wide-gauge rails on wooden ties. A second level or terrace (from which the picture was taken is up-hill. It is occupied by another set of rails with rounded (not flat) tops on which carts are also seen. These appear to service an upper ore bank. A gang of 8 or so workers are on this level above one of the bunkers (30 or 40 feet above the base of the pit). They appear to be sliding earth down toward the bin opening above the cart. Large "rocks" some as big as the workers heads are seen on the talus. These could well be ore "nuggets" composed of limonite most likely.

Interview H's wife mentioned that she was raised in a house located above the mine on a road which led downhill at its edge. The road she described could be a later version of the ore R.R. terrace shown in Renner's picture.

When I mentioned the story of the stopping of the mine Interviewee D agreed "it was something like that". He skated on the pond in the winter, fished in it in the summer. One winter a friend of his lowered a very tall poplar sapling through a hole in the middle of the pond ice. "It went all the way down (30-35') without hitting bottom".

The Washer Pond, Check 15. Interviewee D said everyone always called this area "Washer Dump". He thought "they probably didn't get iron ore there since the pond wasn't very deep". D. noted that Shuff's Spring is located behind the Washer Pond providing most of its water. "A couple of generations of Shuffs lived there and sold water. Jacques bought the place and tore down the house. When he sold it again the Catoctin people still had their water rights. We still get our water through a pipe from that spring!" Renner interprets the ramp as the dump and the pond as supplying the water to wash it - "probably with a ram pump." Old timers speak of the washer as situated near the south end of the ramp. A neighbor asked for and took away a rail which he had to dig out of the north end of the ramp (see Fig. 40). He also pointed out two axles of an iron cart at the narrow neck between the two ponds. He reasons that the ore was brought out of the mine, run up the ramp and then washed on another spur of the ore railroad toward the furnaces. This is essentially the interpretation on Mentzer's map (Mentzer 1974, p.5).

Contract Archaeology, Inc. 1971 interprets Check 15 pond as a "conjectured limestone/ore pit", the same as Check 13. This reference also interpreted a depressed area (Check 21) as another possible limestone/ore pit. These interpretations are considered erroneous on the face of the evidence presented in this section. (Fig. 41)

The Depressed Area, Check 21. Part of the east side of the mine area and washer zone described herein falls off into a depression just west of the Monacacy Valley Railroad line. Renner and Mentzer both identify this area as occupied by a grist mill and a saw mill, each run by a water wheel powered by water from a raceway which runs southward, paralleling the Big Ore Bank pond (Check 13). (Fig. 41) Renner points out that a retaining wall of cut stone similar to that around the furnaces also buttressed this area on its west wall. At one time the wall was waist high and covered the entire west wall. Now it is ground level and some areas of the basic wall are gone. The stone was taken to build cabins on the mountain.

Interviewee D recalls that part of a water wheel was located in the depressed area next to the Paint Shop (Check 14). He also voiced a widespread belief that one of the grinding stones "was at Akers" (Mr. Floyd Akers).

The Paint Shop, Check 14. This late feature in the Catoctin Furnace complex is well known but well hidden in the jungle between Check 13 and Check 15. Mentzer identifies its location correctly on his map (1974). Renner took us to the site giving the old timers data on the shop. The presence of limonite in the mines allowed a good grade of paint to be made by some additional roasting. The product was widely used in the surrounding countryside to paint barns red. (Fig. 41)

### The Intensive Survey (1977)

#### Check 13, Big Ore Bank.

Singewald's Description. The first of the two mines described by Singewald as back of the furnaces has been analysed (Feature 4, Check 12). The second which is 100 yards south of the first is well situated to be the Check 13 pit. This is what he wrote about it:

"One hundred yards south of this opening is another 500' long and 100 to 150' wide also striking North 20 degrees East. At the south end it is 15' deep and at the north end deeper but filled with water to within 15' of the top. The geologic position of these openings is the same as those one mile to the north." (Singewald, 1911, p.199.)

The description fits the Big Ore Bank but it is oriented due North. Today's expression, however, has been modified by over 60 years of human and natural activities and coincidence in trend is neither necessary nor expected.

Charles Sandy's Investigation. Mr. Sandy, Superintendent of Cunningham Fall's State Park, undertook to investigate the bottom of the big pond. Using a 6 inch pump, he pumped day and night for a week and removed about 6 feet of water. At the northeast end of the pond, he estimated that 7 feet of water covered at least 7 feet of muck. In this area he saw the wheels of a cart sticking out of the muck. The cart was retrieved and the wood and iron are today in excellent condition. At the south of the pond he saw log cribbing supporting the west wall, a "turn table" (which may be a cart with two axles and no wheels (see below). He found 6 bricks weighing 20 pounds each and shaped to fit in a semi-circle. He thought these bricks might be associated with an anthracite furnace, such as Deborah, Stack 3. He found several lengths of iron railroad rails, which suggested to him that several time periods were involved.

I examined the artifacts which Mr. Sandy had recovered (Fig. 5). The cart appeared to be the same type as shown in Renner's photo purportedly showing the Big Ore Bank, with a revolving wheel on which the bed of the cart rested. This was to allow the cart to be filled by first moving one end to the bunker bin and then the other. The wheels were dated (Aug. 8, 1872 and

Feb. 15, 1871 on two of them) with the name of the maker: Lobdell Car Wheel Co. Wil. Del. The one rail examined had a "stud" cross-section with a rounded riding surface. A problematical iron object (Fig. 5e) resembled a switch for changing the rail direction of ore carts. It consisted of two rail sections (like the first rail examined) with a socket (for a switch handle in between. Fig. 5d). The paraphernalia recovered gives archaeological support to the folklore about the final day of operations at the mine. The location of Sandy's cart suggests it was on a track connecting the mine with the furnace when it was dumped into the pond. Similarly the 2-axle cart at the south end was probably on tracks there, leading to the washer ramp, when it was similarly dumped.

SHA Maps and the Big Ore Bank, Check 13. The big pit is seen with a base some 50 feet below the existing U.S. 15 lane. The north-south profile shows a gradual rise from a deep point at the north end to the south end where it joins the ditch of Check 15. A flat area, probably a terrace, 25 feet wide intervenes about half way between the two extremities. At the north end some 12 feet above the water level, is another flat area where a road is seen in the Renner photograph and where Mrs. H said was located a road leading to her house. The horizontal contours of the pit feature is changing at the north end as a result of erosion. During our survey two big trees caved off this bank and fell into the pond. The area is especially unstable because it is between the two sources of water, the pond and the channel cut for draining in 1960, etc. The most westerly of two structures noted on Contract Archaeology Inc. 1971 map has apparently eroded away, the second, a cement "dock" is now on the edge of the pond several feet closer than depicted in 1971. (Fig. 41 )

#### Check 15. The Washer Dump Pond.

Test 1. A number of small tests (2 feet square and 1½ feet deep) were placed in the top of the ramp. These tests revealed 8 inches or so of mixed top soil which included traces of grey clay, loam, sand, iron ore fragments such as would be expected if ore were washed on its top (with water taken by ram jet from the pond). Feature 1 is the ramp which is a truncated pyramid, 20' high, 50 feet at its base, and 24 feet wide, on an average, at its flat top (Fig. 40 ). A drainage ditch, Feature 1a, which appears cut by water is 3 feet wide and extends over the east embankment. Its head is reinforced with a large rock. The ramp ends in a talus slope composed of miscellaneous kinds of soil such as would be dumped from the big pit. About 30 feet from the end of the ramp is Feature 1b an iron rail sticking upright in the ground. It was supported by large rocks about a foot underground. We tried to remove the rail but could not since it extended for an unknown depth and was firmly held by the ground. The rail extends about 2½ feet above the ground and would have made a good terminal stopping point for ore carts. A curved-rail spike which had hastily been withdrawn from a tie giving its curved appearance was found near the surface in the vicinity. The rail cross-section was that of a "stud" with rounded riding surface, like the one found in the big pit

by Charles Sandy. (Fig. 5 )

Test 2. This was a 50 foot trench  $1\frac{1}{2}$  feet wide placed in the side of the ramp from its top to the floor of the pond (now dry at this point, Fig. 40 ). It exposed marled soil of several kinds such as would have resulted from earth from the mine dumped here. Several nuggets of iron ore and smears of limonite were seen.

Test 3. Dr. Fauth, our geological consultant, and I examined a 15' face of a profile face made by the waters of the pond flowing over a short fall at the south end of the feature. This naturally cut profile was opposite the end of the ramp and provided a convenient cross section of the strata in which Feature 2, the pond, was situated.

The top 3 feet was a soft chestnut soil similar to that of Check 6, graveyard. In fact, the profile was at the east end of that site. At 10 feet below the surface was weathered phyllite. It continued downward to a grey phyllite bedrock. Between 3 feet and 10 feet were a series of stratified zones of soil which showed wavy contours of contorted action. Dr. Fauth did not hesitate to say that the strata was Harper Phyllite weathered in situ. The stratified zone consisted of thin sandstone and clay layers. One such layer was composed largely of impure iron gravel about  $\frac{1}{2}$ " thick. If this strata were in the area now occupied by the pond "it wouldn't make a very good mine", he said. He saw no evidence of limestone strata in the vicinity of this pond or that of the big pond. These observations seemed to rule out the possibility that the pond at Check 15 was or had been an ore mine; or that "conjectured limestone/ore mines" were to be found here. Feature 2, the pond, was an erosional feature resulting from strong springs on the mountain above it. The pond had collected as a basin-shape due to the erosion of the stratified softer soil layers down to the shale bedrock on which the pond now rested.

We also examined the talus soil at the end of the ramp, remarking on the large iron ore boulders and heterogeneous soils represented there; debris brought there from the big pit mine.

Test 4. A series of short test pit were placed in the area where the ditches of the two ponds meet. Here, as predicted by Sandy, and as shown on Mentzer's 1974 map (p.5), were two axles of a dumped over ore cart. Several areas which were disturbed were turned up but it was seen that extensive digging would be needed to make sense out of the finds. A hatched head of iron resembling a small broadaxe was found here along with another iron spike, curved as the first from being pried out of ties. Between this area, which is called Feature 4 of unknown significance, and Feature 1b, the upright iron rail, two sunken areas were noted on the cross-section profiles. These were about 6 feet wide enough to accommodate a railway line. This was also the area where

Renner's neighbor took up the large iron rail. The area is called Feature 5, and with the other points serves to identify the hypothecated railroad line up the ramp which may be checked in future excavations.

Check 21. Depressed Area. Since this area was outside the easement area of the Alignment 1 corridor no tests were put down here. The remnants of the retaining wall said to be here by our interviewees was distinguished through the bush. It extended from the surface to an unknown depth and for an unknown distance to the north. This was Feature 1 of the check. Feature 2 was the point at which a stream some 6 feet wide and 5 feet deep cut through the surface of the depression edge to fall below. This was supposed to be the site of the grist mill water wheel. A mound of known debris probably represented the mill ruin.

The SHA cross-section maps showed this depressed area quite well as indicated in Fig. 24b. The ramp, Feature 1 of Check 15 is a gradual continuation of the plateau above the depressed area. Probably the ramp got started here as **earth debris** from the Big Ore Bank and gradually grew out over an open space made by the eroding springs above Check 15. The erection of the ramp in effect created the pond by giving it an east bank, or improving on what was there naturally.

Check 14. Paint Mill. Singewald, 1911, mentions the Paint Mill (p.147): "...the Catoctin Mt. Iron Co. was formed (1888) which lasted until 1892. A paint mill was erected and operated for several years during this time producing blue, red, and yellow ocre from the banks north of the furnace (Fitzhugh-Kunkel ore mine) which are in operation at the present time (1911)."

The site consists of a stone foundation about 20' square with a mound of bricks extending to the south for an additional 35 feet from the middle of the stone enclosure. Several yellow bricks with one side glazed indicated the near presence of the oven or kiln for roasting the limonite. The stack which is remembered by old timers was probably the extension of the brick mound.

Other finds included the very abundant red bricks measuring  $3\frac{1}{2} \times 4 \frac{1}{8} \times 2 \frac{1}{8}$  inches with the numeral "3" on one face. They had been made in a mold, one side showing the scraping striations of the stick over the top of the mold. Two fragments of clear window glass  $\frac{1}{8}$ " thick were also found. Mentzer also located the Paint Mill in this vicinity (1911, p.5 map).

### Interpretation

The survey bears out the Renner-Mentzer interpretation of the two-pond area southwest of the Catoctin furnace rather than the Contract Archaeology, Inc. interpretation. The big pond is the Big Ore Bank recognized by Singewald in 1911. The small pond is the Washer Pond or Washer Dump Pond. The large ramp to the east had been built up from washings and tailings from the mine. An ore

railroad, using ore carts drawn by mules ran up the ramp and back to the furnaces after the ore was washed. A raceway carried water for power to a grist mill and a saw mill located in a depressed area having a retaining wall similar to the one west of the furnaces. The Paint Mill is a late feature which baked limonite to make ochres for paints. The pumps which kept the water in the pit under control shut down one Sunday night in 1903(?). It is still filled with mining equipment and tools, apparently in good condition in the muck.

### The 1979 Excavations (Fig. 39)

#### The Ore Buggy and the Stream.

The cart was lying on its side with two axils, lacking wheels, and exposed above the stream soil to show 8 inches of badly weathered iron bars. When the cart was excavated from the stream it was found that the wheels had been removed from the other side also. The buried axle parts showed no rusting. Each axle was 48 inches in length and was attached by bolts and cleats to heavy square beams measuring 68 inches lengthwise and 34 inches across. Some of the beams still had red paint on them. The stream, which connected the flooded ore mine with the washer pond, was explored for approximately 30 feet on each side but no artifacts were found.

#### Test Excavations

A series of tests and trenches were placed at intervals of 10 feet along the bank of the stream in search of evidence of the

ore railroad, but subsoil was found in each test directly underneath a thin humus. It is believed that the railroad did come out of the mine and convey carts, drawn by mules, up the ramp to the south. A rail had been found upright at the end of the ramp and another rail reported found on the ramp (Orr and Son, 1977, pp. 64-65). A depressed area 6 feet wide, railway tie spike, and a broadaxe were also reported found earlier. It is probable that the rails and ties had been removed earlier. It is also probable that the ramp platform was changing constantly due to the addition of soil from the ore washings and that the tracks and ties were themselves in a sense portable and had left no permanent mark.

### Observations.

It was noted that 220 feet east of Station 562 a square made of stones measuring 10 feet on a side were seen on the south bank of the raceway. Similar stones were noted on the north side of the raceway also. It is believed that these stones made an abutment or base for a bridge over which the cars would go in returning from the ore washer ramp to the furnace area.

### Interpretation

1. The ore cart is similar to that dredged from the Big Ore Bank Pond by Mr. Charles Sandy, superintendent of the Cunningham Falls State Park a few years ago. The wheels on Sandy's cart were dated 1871 and 1872. The vehicle depicted was similar to that shown drawn by mules in a picture reported to have been taken of the Big Ore Bank mine prior to its flooding in 1903. Such carts had large boxes for containing the ore mounted on a free spinning iron wheel. The rails found by Sandy had round (not flat) rail tops.
2. The railroad section which was outgoing to the ramp does not appear to have left evidence of its presence which could be recognized within the right of way area.
3. The railroad route returning from the ramp with cleaned ore enroute to the furnaces undoubtedly passed over a bridge spanning the raceway and indicated by a prepared base of stones.

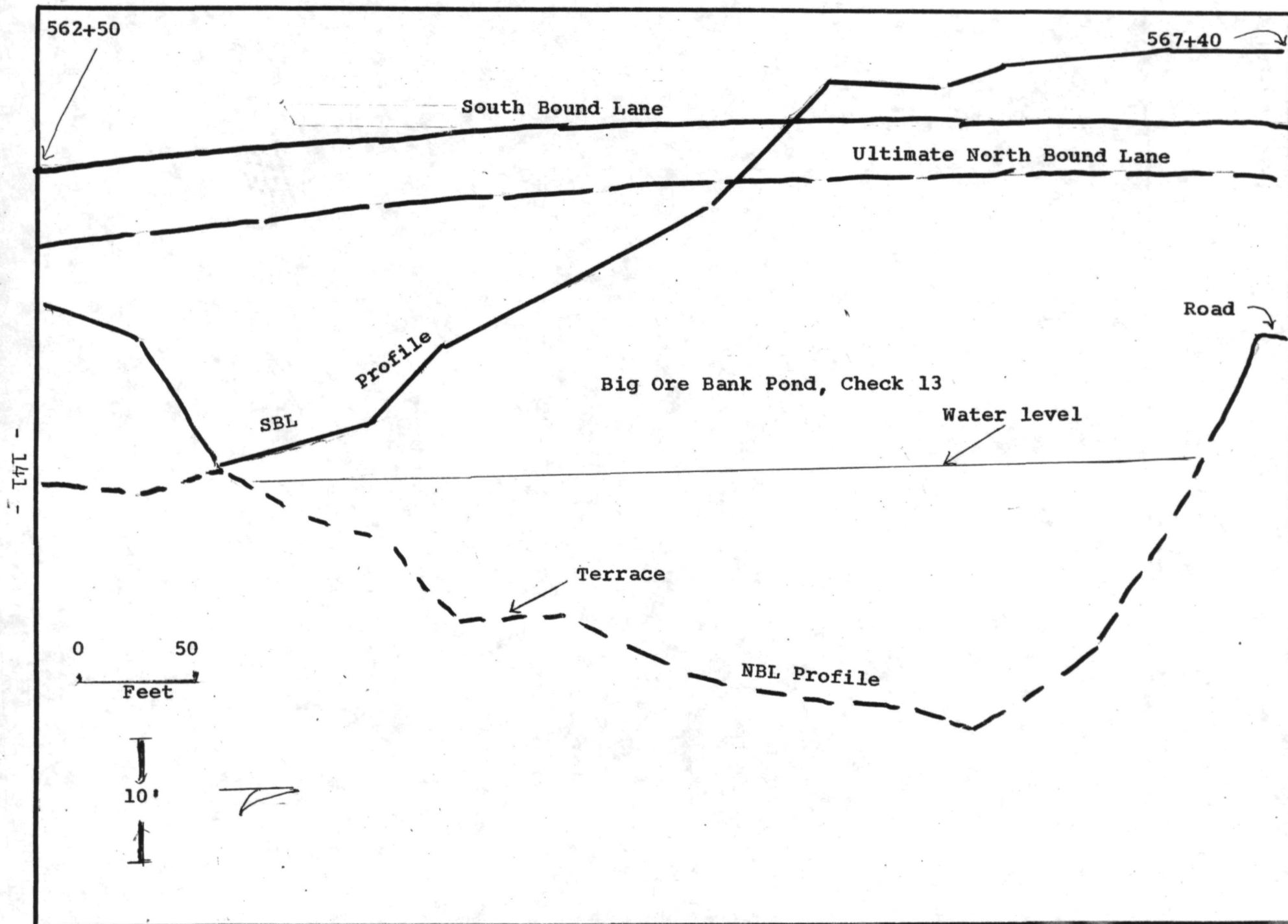


Fig. 42. North-south profile from Station 562+50 to 567+40.  
Check 13, Big Ore Bank Pond Profile.

CHECK 17, RACEWAYS  
(18FR331)

Research Design

The original research design for the raceway features in Checks 4 and 17, while essentially correct in conception, proved insufficient in scope (Orr et al, July 1979, Figs. 5, 11). The six small trenches called for in the plans became eight large trenches and several smaller trenches and test pits as the excavation proceeded. Instead of one raceway system, atleast two materialized. The unexpectedly large size of the raceway cross-section was the cause of the miscalculation. This was only determined by extensive excavation. As the dig proceeded, the SHA backhee in expert hands proved adequate to the enlarged task. Fig. 43, 45)

The objectives of the research remained the same as originally conceived namely to understand the form and function of the raceways and their interrelations with those discovered in other areas. The basic technological questions remained constant - involving water source, flow volumn and velocity for providing water power to produce the air blasts for the furnaces, to grind, saw, and hammer in the grist, lumber, and paint mills of the Catoctin industrial complex.

Land Records research, started as a volunteer activity by Mrs. Marie Burns of the Catoctin Furnace Historical Society, proved invaluable in providing locations for and data concerning the raceways and their water rights. The potential of oral history has also been felt in pointing out the several water power systems in operation during the long period the site was in operation.

The 1979 Excavations

Trench F. (Fig. 46) (See Addendum Page 40)

This backhoe trench was cut into the north end of Auburn Dam where the raceway from the North runs into the dam. Feature 2 was found directly in line with the course of the raceway. It was a low truncated pyramid topped (under a thin humus) by a thick clay lens which rested on several layers of grey clay, thin layers of alternate sand and clay, and the dark muck of Feature 1.

Dark, organic muck flanked the feature on the east and lapped-up the side of the dam bank. The bank was a mound of loam soil built on a thick base of furnace tailings. Furnace debris also littered the top of the subsoil directly under the bank and Feature 2. (Layer 3A)

### Cultural Material Associated with Trench 1.

Catalogue No. 104, 0-6" below surface.

- 1 tin can.
- 1 sherd with brown salt glaze.

Catalogue No. 163, 3' below surface, Layer 3A, at S0.

- 1 clasp knife with tortoise shell handle (treated).

Catalogue No. 166, La. 3B at S0-S10.

- 4 charcoal fragments.
- 2 iron fragments.
- 1 brick fragment.
- 12 rocks.

Catalogue No. 210, Layer 2 in dam bank.

- 4 charcoal fragments.

Feature 1 is a semi-circular channel proceeding in a north-south direction under Feature 1 clay lens surmounted by the red clay fill of U.S. 15's right-of-way shoulder. Feature 1 contains dark muck gumbo and several strata of water-born clay and sand. Cultural materials are associated with Feature 2 through Layer 3B.

### Interpretations:

1. Feature 1 is a raceway channel cut into subsoil as Phase 1 of this site. It represents an early hydraulic power system (System A & B) and preceded the dam & F2 which are clearly superimposed upon it. The cultural materials from Layer 3B, a construction fill resulting from the excavation of Feature 1 channel, indicate that the iron industry had already been established before this raceway was built. The flow of water during Phase 1 was both rapid and slow, in other words controlled, as seen in the surviving clay and sand deposits of Layer 7 which flanked the east side of the channel. Layer 10 is a similar clay lens deposited during a low, and slow period of raceway water flow. The charcoal flakes in Layer 3B, construction fill, suggests the burning of vegetation over the site prior to construction of the channel. The gumbo muck fill in the Feature (Layer 9) clogg with organic, swamp soil in a long period of disuse prior to the building of the Auburn Dam.

2. The second phase of the site was initiated with a foundation of furnace tailings (Layer 3A) which underlay the construction of the Auburn Dam bank with brown sandy loam, Layer 2. After the dam bank was thrown up Feature 2, raceway, was erected extending into the dam as the end segment of hydraulic system B supplying water to the Auburn Dam. The light grey and yellow clay lens (Layer 5) was supported on a platform of dark grey clay (Layer 6). The effect of the dam waters around the raceway terminal is seen in the wearing down of the clay basin with water deposited clay layers on its east side. The dam waters were most shallow at this entrance point for the raceway water. This was an end segment of System C entering the dam.

3. Phase 3 of the Trench 1 backhoe cut was the result of the construction of U.S. Route 15 in 1960. The top of Feature 2, raceway (Layer 5) was planed away in this construction and a red clay fill shoulder (Layer 8) superimposed. To ensure correct drainage for the road located directly to the west a berm ditch was cut.

#### Trench 2. (Fig. 47) (See Addendum Page 40)

Trench 2 was a backhoe excavation 40' by 9' by 4' wide. The cut revealed a stone wall (Feature 1), 6 soil fill layers, a clay basin (Feature 2), and a zone of close-packed field stones (Feature 3). This cultural complex was cut into a sloping hillside and rested on a thin yellow subsoil and in part on shale bedrock. Feature 1, stone wall, is part of a stonewall which extends approximately 150 feet to the north, and 50 feet to the south where it was intercepted and destroyed by the construction of the shoulder of U.S. 15 (1960). Feature 2 was a bowl-shaped basin of grey clay the curved top of which was covered with humus and talus which had accumulated since the abandonment of the archaeological complex. The stone wall, Feature 1, protected the basin, Feature 2, from encroachment of the hill slope, the soil fills supported the basin, and the stone mass at the east end of the complex served as a buttress for the entire ensemble.

#### Cultural Material Associated with Trench 2:

Catalogue No. 68. Check 4-17, F3, Tr. 2, 4.6' b.s. Layer 7, S30.

1 grey ware sherd with brown salt glaze.

Catalogue No. 78. Check 4-17, F3, Tr. 2, 50" b.s., Layer 7.

1 dark green, blown glass fragment.

2 flagstones (Slate).

6 fieldstone fragments.

Catalogue No. 1019. Tr. 2, N35, Layer 7.

1 walnut shell (shrunken and decomposed)

Catalogue No. 1023. Check 17, Tr. 2, 0-24" at wall. Layer 9 (upper).

3 glass fragments

2 whiteware sherds

(Cat. No. 1023, contd.)

- 1 blue, shell-edged pearlware.
- 1 iron nail.
- 2 slag fragments.
- 3 redware sherds.
- 1 fieldstone fragment.
- 1 shell fragment.

Catalogue No. 1025. Tr. 2, Layer 5.

- 16 iron ore fragments.
- 1 slag fragment.

Catalogue No. 1026. Check 17, Tr. 2, 29-42" b.s. at wall, Layer 7.

- 1 whiteware sherd
- 1 clay fragment containing charcoal dust.

All of artifacts were included with fill hence were not functionally related to the archaeological complex having been brought in from somewhere else. The iron-ore and slag fragments as well as the two red sand layers indicated furnace tailings. The pearlware and blown glass suggests that the archaeological complex is not earlier than the first half of the 19th century.

Interpretation:

1. Trench 2 is the cross-section of a raceway consisting of a retaining wall (F1), a water-flow basin (F2), supporting strata, and a stone buttress (F3).

All features and fills are necessary are necessary for the functioning of the raceway, and there is no evidence of a time hiatus in the construction of the raceway (such as a humus level in the middle of the complex would imply). Therefore the finds indicate a single phase of construction done purposefully and more or less rapidly.

2. The raceway was constructed in the midst of iron industry debris as indicated by tailings inclusions in the fill as well as the no doubt purposeful use of red sand (characteristic of casting house floors) as a foundation for the basin for for the total complex to facilitate drainage.

3. The raceway was probably built in the 19th century, as seen in the presence of artifacts characteristic of the earlier portion of the 19th century in the fill, and lack of 20th century artifact types.

4. The raceway is part of the hydraulic power system which provided water for the Auburn Dam (System C).

Trench 3. (Fig. 48 , also Fig. 13, Appendix A) (See Addendum P.40)

Trench 3 like Trench 2 was a backhoe excavation which was explored to its subsoil perimeters with shovels and trowels during which time the excavated soil was screened and cultural material recovered (1/8t inch screen). The excavation was 40' by 8 1/2' at its deepest point by 4' in width. The cut revealed a stone wall (Feature 1) which protected a grey-yellow clay basin (Feature 2). The basin was supported by a series of horizontal gumbo and sand strata anchored by a trench cut into the subsoil. The clay lens and supporting soil strata were buttressed on the east by a wedge-shaped mound of earth, a loosefill of silty clay. The source of the buttress wedge (Feature 3) was in part probably the 7 by 4' trench at the base of the super-imposed strata a strata of shale bedrock on the east wall of this anchor-trench with copious flakes of shale in the in the loose fill of the buttress (Feature 3). The sand strata of the horizontal fill layers was identified by Dr. Fauth, Geologist of the project, as furnace tailings.

Fauth identified 16 geological strata in his study which was carried out prior to the completion of excavations in Trench 3. (Appendix A, Fig. 13). The correlation of these strata with the archaeological layers of the excavation are as follows: Top Soil - Layers 4, 4A (Talus and Humus); Strata 3, 5, 6 - Layer 2 (Clay Basin, Feature 2); Strata 7, 8A, 9, 10, 11, 12 - Layers 7, 6, 6A, 3 (Support Strata); Strata 8B, 13, 14, 15, 16A, 16B - Layer 3 (Feature 3, Buttress).

#### Cultural Materials from Trench 3.

46 cultural items were excavated from Trench 3. These materials were, with one exception, Cat. No. 1032) excavated from the support strata (Cat. Nos. 1002, 1003, 1014, 1018, 1022, 1024, 1027, 1033, 1015, 1017, 38 of the items were associated with the iron industry: 3 iron fragments, 1 ash, 7 charcoal fragments, 27 slag fragments. 7 fragments were domestic debris: 1 nail, 1 whiteware with blue transfer print, 2 white-ware, 2 greyware, 1 green glass fragment.

The transfer print was a 19th century type. The nail was cut with a forged head consisting of 4 blow imprints ("rose head" nail) a type identified as belonging to the late 18th and early 19th centuries. The 3 greyware sherds were of identical ware displaying a prominent dimpled surface characteristic of salt glaze. One sherd was found at the base of the retaining wall among the fieldstones of that feature (Feature 1). This sherd (Cat. No. 1032) had the stamped name "Myers) impressed on the outer surface with capital letters. A second sherd of this greyware group (Cat. No. 1015) came from Layer 5, and the third sherd from the base of Layer 6 (Cat. No. 1017). These sherds were from the body of a globular vessel. They have been identified by Ms. Cousans, ceramist of the project, as having been manufactured locally (Philadelphia?) during the 1st half of the 19th century. The 3 greyware sherds are directly related to events at the time of the archaeoglogical complex of Trench 3, but the other cultural materials were inclusions with the fill layers and related to events taking place in outside areas at an earlier time period.

### Interpretation:

1. The archaeological complex of Trench 3 is similar to that of Trench 2 in having a retaining wall, a clay basin supported by horizontal strata. The surface manifestations of these features indicate a continuity between the complex of the two trenches which is extended for a considerable distance on both sides (Fig. ).

2. The function of the features of Trench 2 and 3 is that of a raceway with the water channel being the grey-yellow clay basin (Feature 2). Since only one water channel is identified, and the other strata are related to the support, buttressing, and retaining wall functions of the raceway - it is clear that only one raceway is represented, and no other functions are suggested by the remains.

3. The industrial debris and red sand tailings represent fill and fill inclusions associated with the Catoctin Furnace activities known to be carried on in the vicinity. The time period of the fill artifacts spans the late 18th and early 19th centuries.

4. The greyware sherds found scattered vertically in the section excavated were probably from a bottle containing liquid used by the builders of the raceway. The bottle broke, probably on the retaining wall during its construction and its fragments fell into the open section then under construction. The construction is seen as proceeding from north to south at this point, and the probable date of that construction is in the 1st half of the 19th century as seen in this dateable vessel. (Hydraulic System C)

Check 4, Feature 3, Stone Wall; Check 4-17, Tests 1-3. (Fig. 44 , Fig. 6 )

### Surface Observations: (See Addendum Page 40)

A dry-stone wall, 43x8x1.5' made up of fieldstones, 8x12" by 6" thick, formed the west-side backdrop of Check 4, Spring-Bathhouse. The wall was originally labeled "Check 4, Feature 3" in the intensive survey (Orr and Orr, 1977 and remained so designated although it was soon understood that the wall was an integral part of Check 17, Raceway. As seen in Trench 2 and 3 profiles and quite apparent in surface observations a much lower stone wall than Check 4, Feature 3 retained the upslope soil thus protecting the raceway water channel. The channel basin was furthermore buttressed on the east by wedge-shaped soil and stone masses. It is clear that Check 4, Feature 3 stone wall continues the line of the buttress and thus assumed in part the function of Feature 3 in Trenches 2 and 3. The Check 4 stone wall also serves the additional function of retaining the raceway complex thus protecting the Spring-Bathhouse area. The wall is set on irregular bedrock from which the waters of the two springs flow at an approximate elevation of 440'.

At the north end of the Check 4 wall, the stone structure has collapsed largely as a result of the pressure from a .5' diameter tree.

At the south end, the wall is hidden in the slope of the hill which includes talus and the removal of stones. However, it becomes a very low wall at this point. Large, isolated fieldstones, apparently originally part of this wall are found intermittently until the Auburn Dam bank is encountered at approximately median point 543 + 30' where the raceway disappears into the dam. The low retaining stone wall on the west side of the raceway is seen above the surface as a dry stone wall some 2 feet high. However, this wall disappears on the surface at about median point 544+90'. Also the broad road-like water channel, now flat due to humus-talus accumulation, becomes a narrow path between the Check 4 stone wall and the slope of the U.S. 15, right of way. This also disappears as the raceway complex enters the dam.

In order to explore further what happened to the raceway and to establish an expected continuity between the trenches identified as containing the raceway layers (Trenches 1 and 2) a series of test pits were cut into the top of the Check 4 wall.

#### Test Pits 1-3: (Fig. 44 )

The profiles of these three test pits share in common a red clay fill covering a light grey clay zone superimposed on a dark soil layer. To the east of these layers are loams containing sandy tailing which are retained by the Check 4 stone wall. In tests 2 and 3 a few large stones were found.

#### Cultural Material from Tests 1-3:

The following cultural material was found at distances from 18 to 36" in the loam areas and under the clay layer. No cultural material came from the red clay area:

Industrial debris (iron industry) - 7 slag fragments, 1 iron fragment.

Domestic debris - 1 bottle base, 1 iron horseshoe fragment, 1 brick fragment, 1 redware sherd, 1 whiteware with blue transfer sherd.

#### Interpretation:

1. The raceway complex seen in Trenches 1, 2, and 3 are repeated in the three test pits across the top of the Check 4, stone wall. The clay water channel is seen in Layer 2. Layer 3 is seen as a support layer under the basin. Layers 4 and 5 and the stone wall itself is interpreted as the buttress complex supporting the basin and its supporting layers.

2. Layer 1, the U.S. 15 right of way fill was superimposed on the raceway probably after plaining away the expected humus in areas. The red clay completely filled the old channel. Following this a birm ditch was cut to allow for drainage paralleling the road.

3. In Summary: Check 4, F3, Test Pits 1-3, Trenches 1-3 reveal the raceway of hydraulic System C which conveyed water in a wide clay basin to the Auburn Dam.

#### Trench 4. (Fig. 49)

This backhoe trench was cut into the Auburn Dam floor in an east-west direction. It revealed two main features consisting of superimposed bowls in which Feature 2 was inside Feature 1. Feature 1 contained yellow sand strata, and Feature 2 was a dark, organic soil. Feature 1 had been cut into the red Triassic geological period red clay which underlies the area and was used for construction purposes by both the Catoctin Furnace buildings and the Maryland State Highway Administration in the construction of existing Route 15. No cultural material was found in Trench 4.

Interpretation. Four phases are represented: Phase 1 - a raceway of Hydraulic System A, Feature 1; Phase 2 - a smaller raceway cut into the first, Hydraulic System B, Feature 2; Phase 3 - sedimentation from the waters of the Auburn Dam (Layers 2,8,10,11); Phase 4 - construction fill and berm ditch of U.S. 51, 1960 (Layer 1 and ditch). Both raceways were filled-in by water-born sediment. Feature 1 was redug and filled in prior to advent of Feature 2. Each was covered by Auburn Dam sediment.

#### Trench 5. (Fig. 50)

This is a trench cut into the shallow gumbo and sand strata of Auburn Dam on the East and a feature consisting of horizontal clay and sand strata on the West of unknown function which disappeared under the existing road. 2 iron frags. with slag adhering in La. 6.

Interpretation. No evidence of the raceway was seen at this point. It is possible that the raceway connecting that feature in Trenches 4 and 6 had been removed.

#### Trench 6. (Fig. 51)

This backhoe trench was cut through the Auburn Dam bank into the dam floor. Four major features were uncovered. Feature 1 was a semi-circular trough cut into the red clay subsoil and filled with yellow clay. Feature 2 was a semi-circular feature smaller than Feature 1 but also cut into the subsoil. It was filled with red clay fill. Feature 3 was the red clay fill of the dam bank construction. Feature 4 was the dark sand and clay of the dam fluvial deposits.

Cultural Material from Trench 6: The following materials were found in La. 6, fill of Feature 1: 1 iron casting gate (top); 12 slag fragments (1030, 1031). 3 slag fragments, 1 with charcoal, 1 brick frag. came from base layers of sand in the dam (1029). The following were found in Layer 5, dam gumbo: 7 slag frags., 2 charcoal frags., 7 reddish rocks, 7 field rocks.

Interpretation. Features 1 and 2 were two phases of System A & B raceway. Feature 1 was the earlier raceway. It was filled with yellow clay and abandoned prior to the building of the dam bank. Feature 2 on the other hand was open at the time of the dam construction and was filled with the red clay fill of the dam bank. Feature 3 was the red clay fill of the dam bank construction. Feature 4 was the dark sand and clay of the dam fluvial deposits. The dam waters were at first swift, carrying grains of sand, and later became stagnant as seen in the mud deposit that comprised the bulk of the dam sediments. Iron industry debris was common.

Trench 7 (Fig. 52)

This backhoe trench was placed in the west side of the Auburn Dam stone wall. Feature 1 was a semi-circular trough cut into the red clay subsoil. A small stone wall had been built directly to the West of Feature 1. Stratum 1 was a foot-thick, dark organic soil which overlaid Feature 1 and disappeared under the stone wall of the dam. Feature 2 consisted of large stones of an unknown feature underneath the construction fill and debris of the dam. Red fill topped by humus completed the strata in this cut. Abundant charcoal was found in Layer 1, but no other cultural material.

Interpretation. Feature 1 is a continuation of the raceway trough of System A. It was supported by a small retaining wall of loose stones. The trough was filled, upon completion of its function as a raceway, with yellow clay. The area was abandoned and not used for a time period as indicated by Stratum 1, dark organic zone. The dam construction took place on top of Stratum 1 indicating the passage of some time before that event took place following the abandonment of the System A raceway represented by Feature 1 of Trench 7 and Feature 1 of Trench 6 which closely resembled it. A large stone feature of unknown use was associated with the raceway. A period of construction of the dam followed by a period of stabilization is charted in Strata 2 and 3. Another period of construction took place, probably on the dam as seen in Stratum 6 which is topped by the present humus zone

Observations. Trenches of the Team A excavations of Check 3 to the south of Trench 7 revealed the arc of a trough filled with yellow soil and overlaid with a dark, organic soil. The direction of the trough and overlay is toward the iron-working site of Check 3 investigated by Team A.

Interpretations. It is believed that the raceway of hydraulic System B powered the iron-working machinery of Check 3 site investigated by Team A. This occurred at a time period prior to the construction of the Auburn Dam.

Conclusions (See Addendum Page 40)

Two systems of hydraulic power are evidenced in the two raceways found in this site. System A, the earlier one powered the southern complex below the Auburn Dam at a time when the dam had not been constructed. System B. was built specifically to power the Auburn Dam at a later period. Additional information should be sought on System A as it pertains to the further exploration and mitigation of Check 3, iron-working site.

The Trench 5, Feature 2, headrace did not belong to hydraulic system A or C, but represented a system which was in operation just before the construction of the Auburn dam at which time it was still open. This represents Hydraulic System B which should be further explored as leading to (or from?) the last iron-working features prior to the erection of the dam for powering the conjectured forge by means of the Hydraulic System C complex.

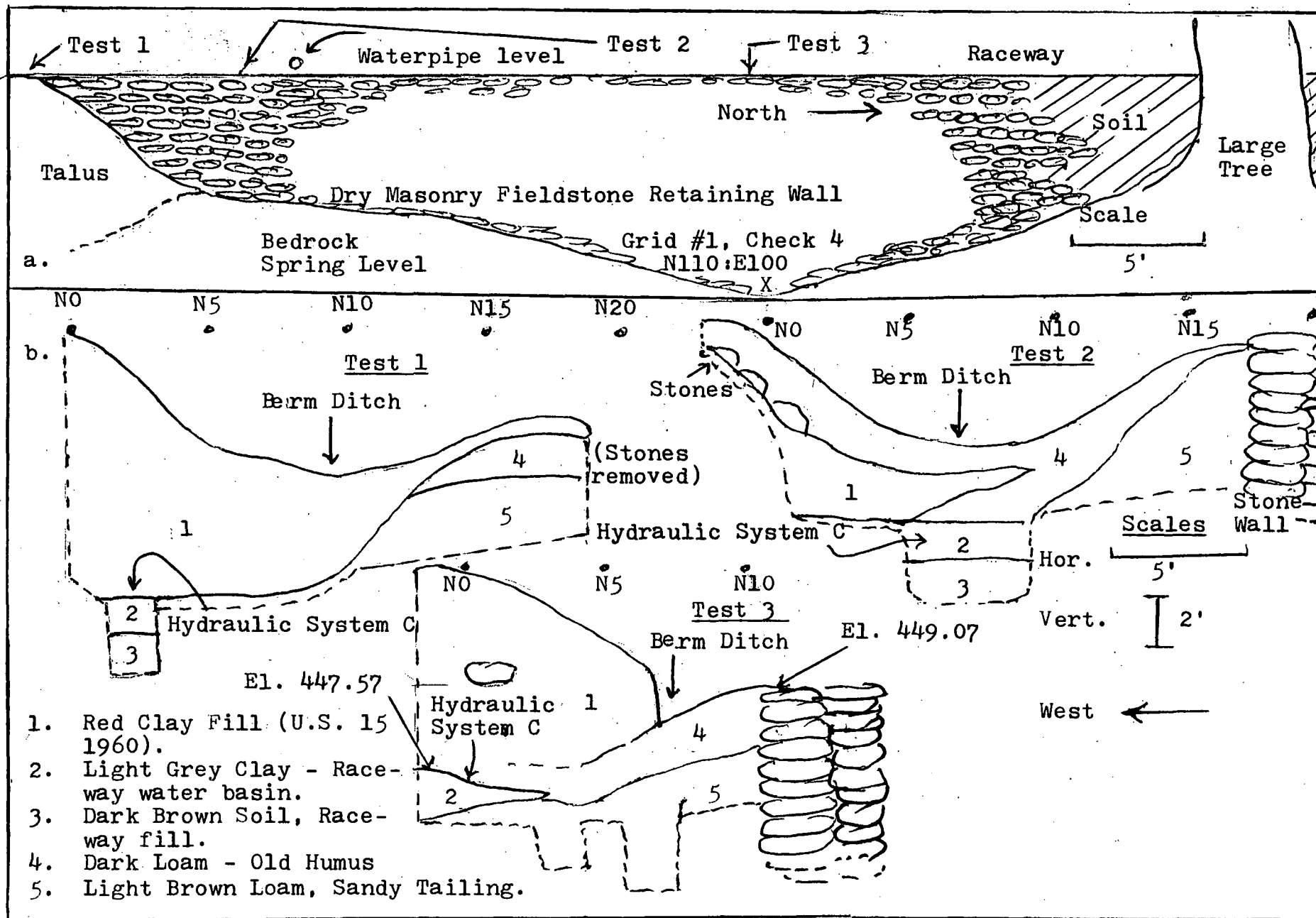


Fig. 44 . a. Check 4, Feature 1, Check 17, Raceway Retaining Wall, facing West.  
b. Check 17, Exploratory Tests 1-3 into top of Check 4, Feature 1 Raceway of Check 17.

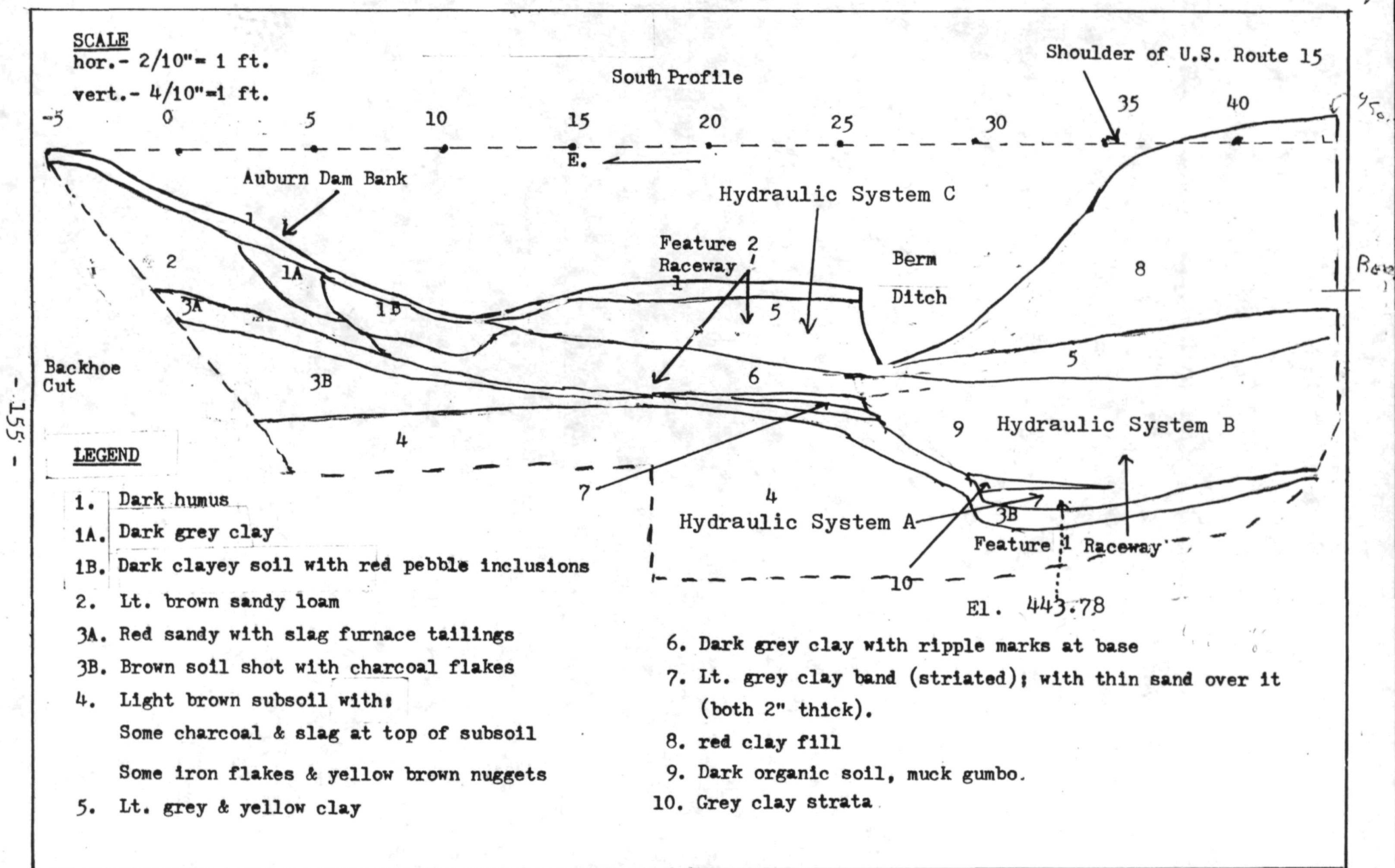


Fig.46 . Check 17, Trench 1, End of Raceway in Auburn Dam (Feature 2) over earlier Raceway (Feature 1)  
 Hydraulic Power Systems A,B,C.

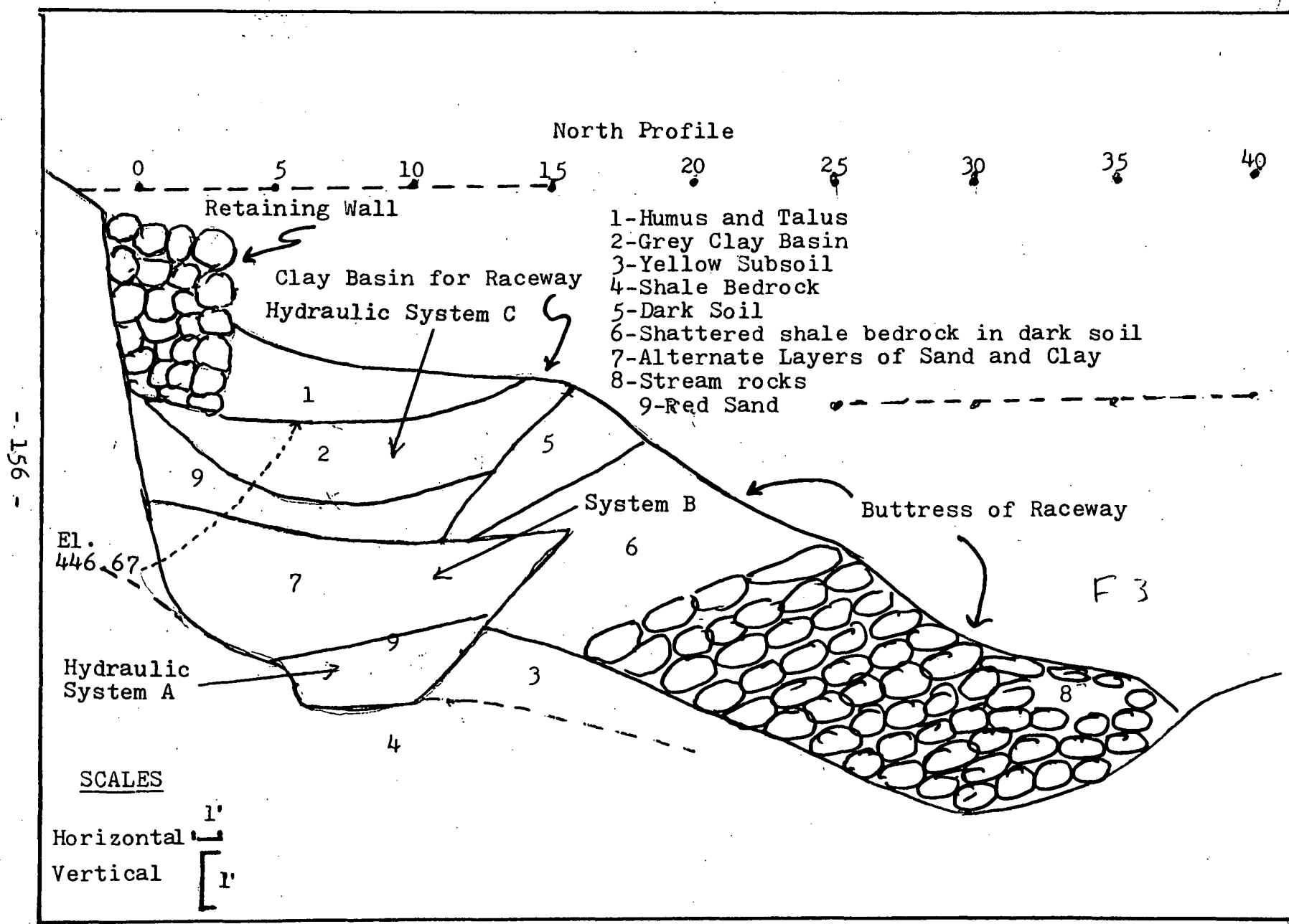


Fig. 47. Check 17, Trench 2, Raceway of Hydraulic Systems A, B, and C.

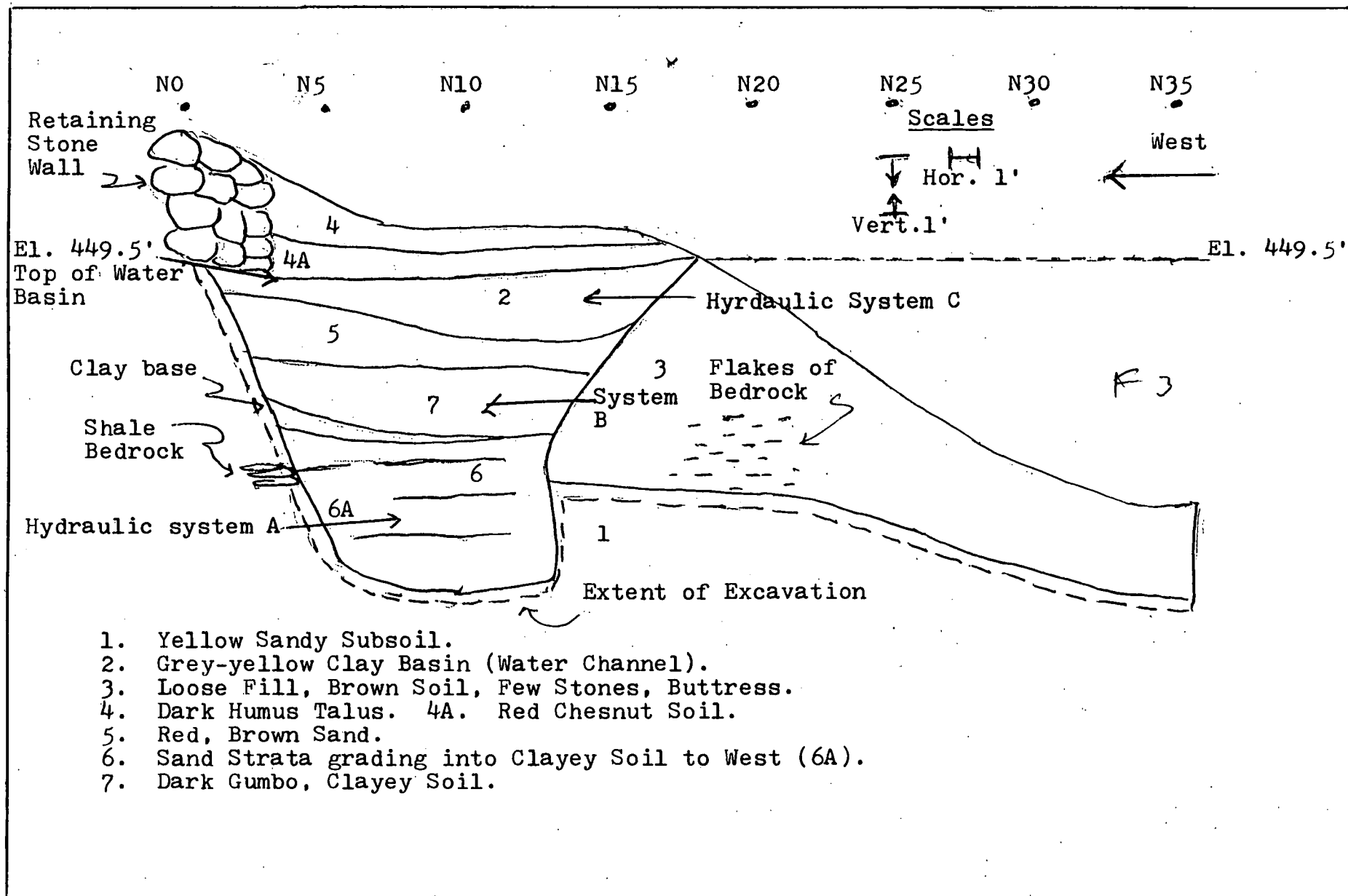


Fig.48 . Check 17, Trench 3. Raceway of Hydraulic Systems A,B, and C.

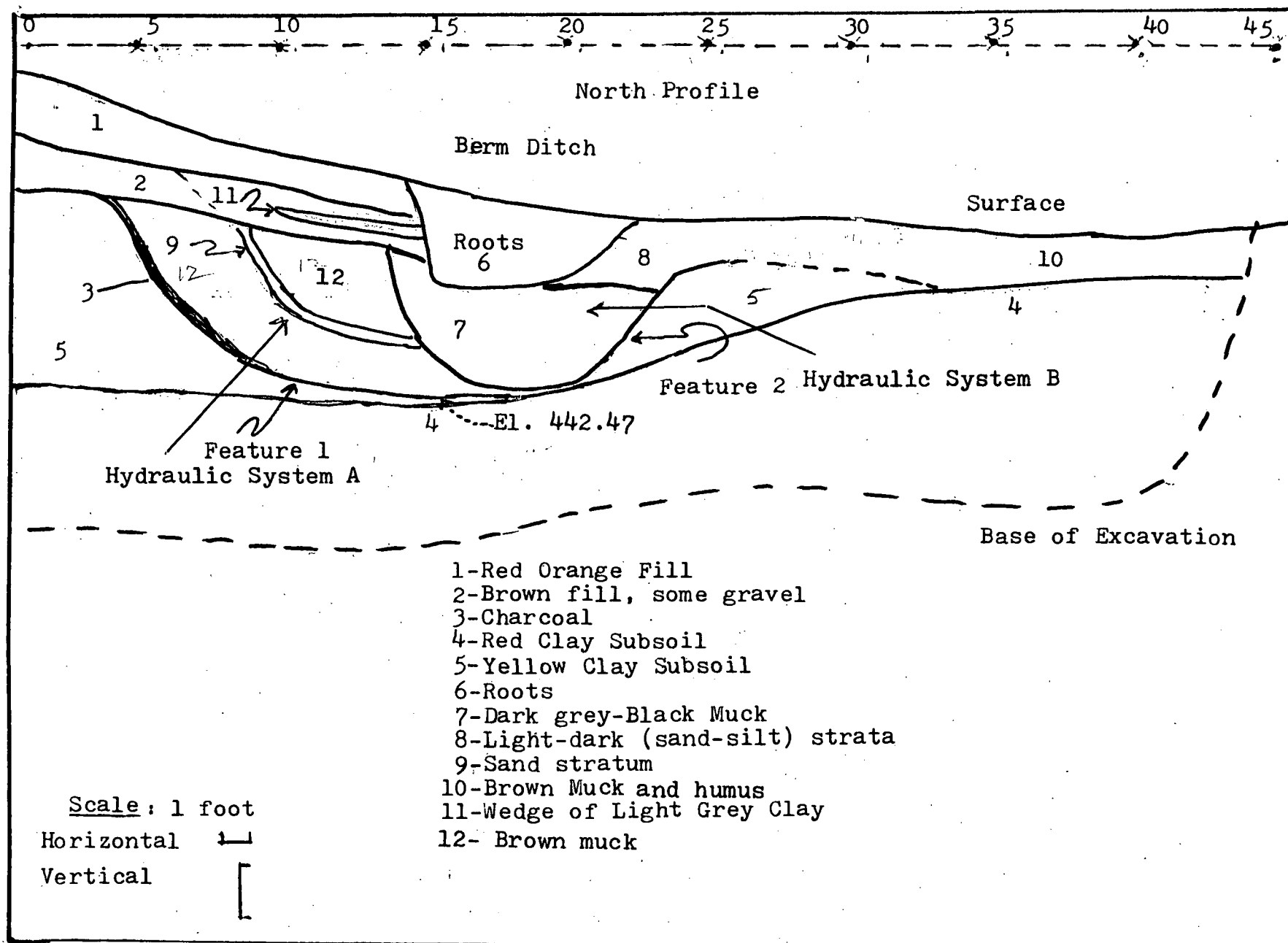


Fig. 49. Check 17, Trench 4. Feature 1 represents earliest hydraulic system A. Feature 2 represents system B. System B was probably in use when Both are covered by Auburn Dam muck.

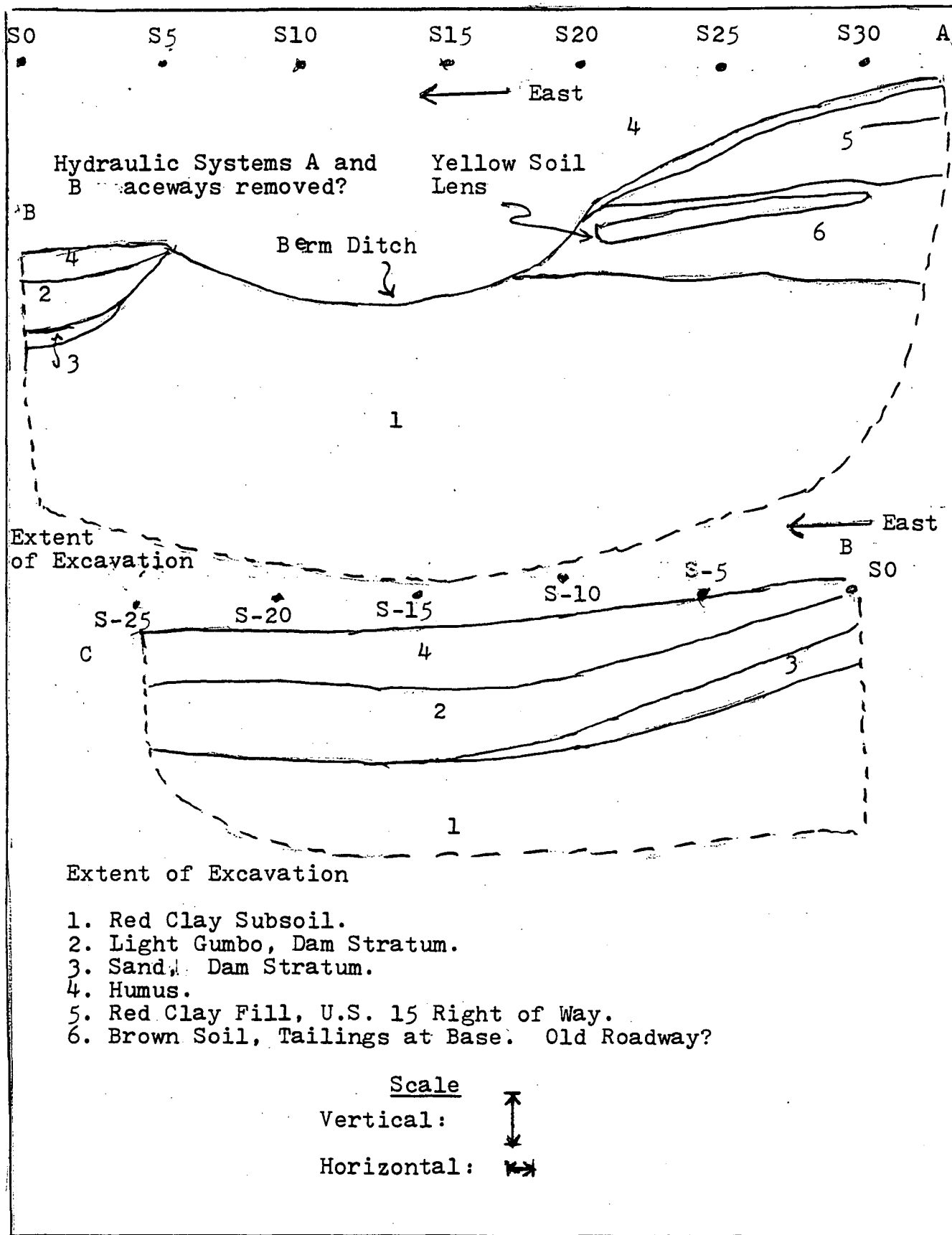


Fig. 50. . Check 17. Trench 5, Auburn Dam Strata and U.S. 15 (1960) Construction. Section A-B-C Backhoe Cut.

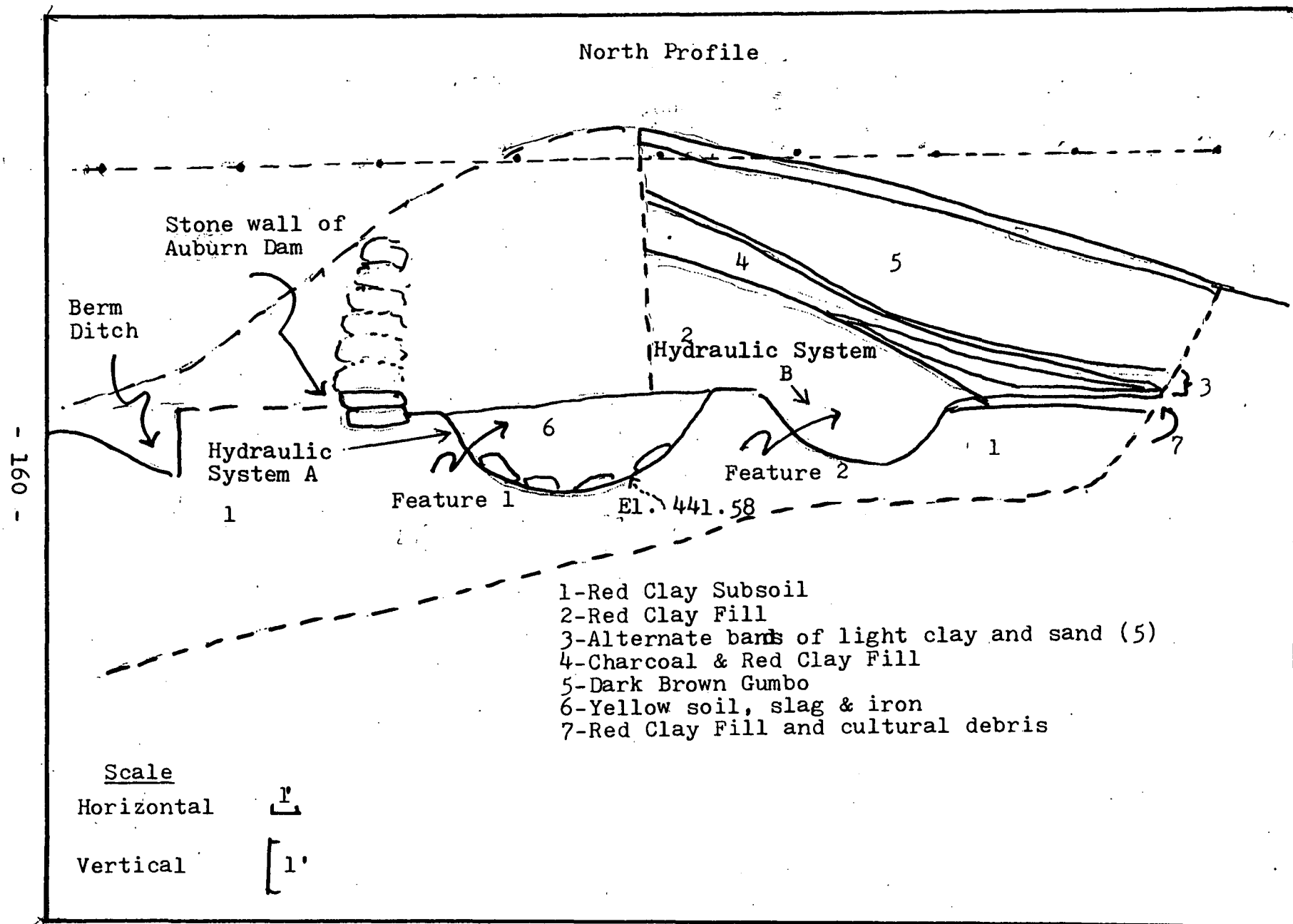


Fig. 51. Check 17, Trench 6, Auburn Dam area. Feature 1, Raceway, (System A)  
 Feature 2, Raceway (System B). Auburn Dam constructed over the two.

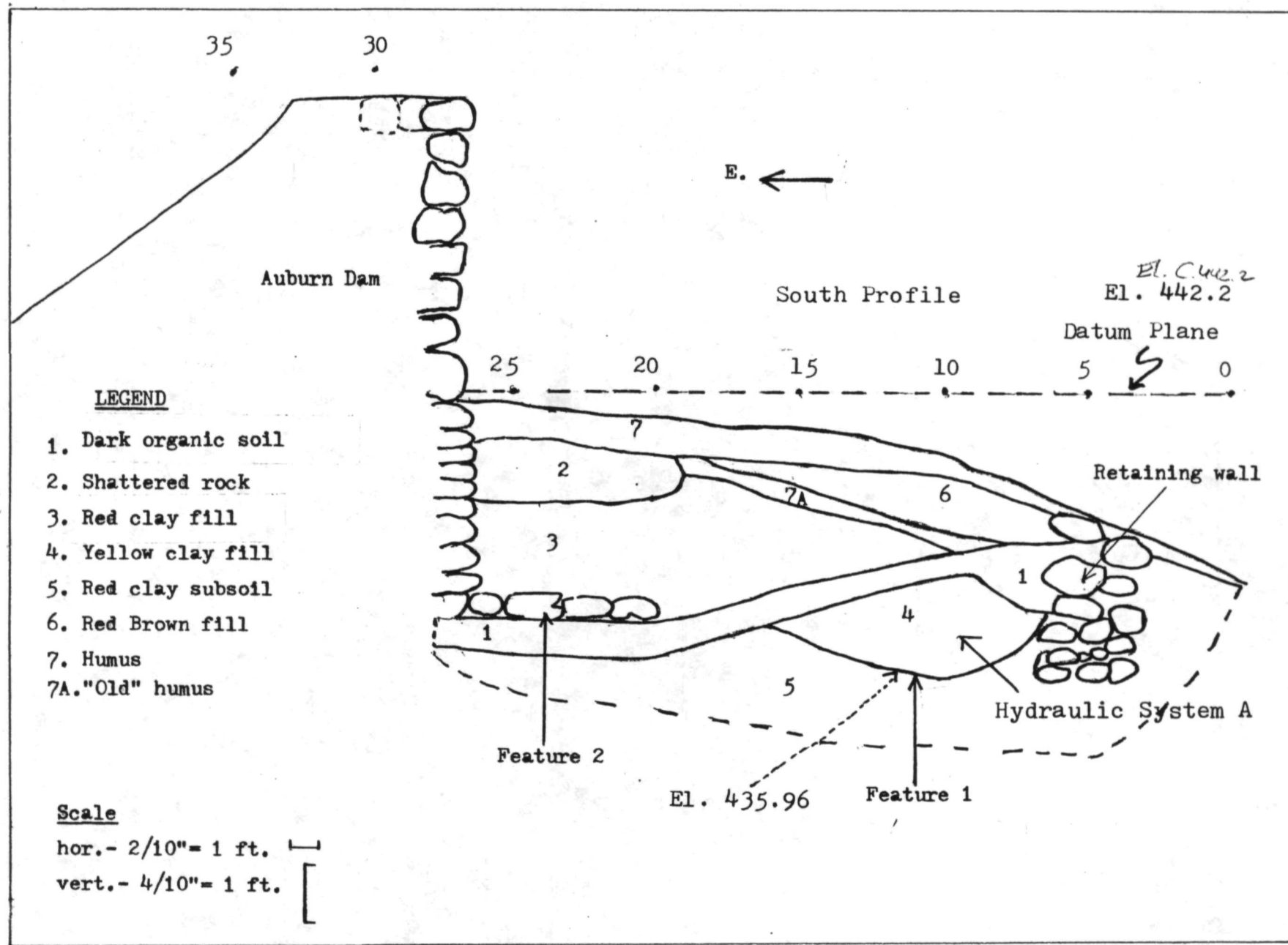


Fig. 52. Check 17, Trench 7. Feature 1, Raceway; Feature 2, unknown feature.  
Feature 1 represents Hydraulic System A of early time period.

## CHECK 19. LIMESTONE QUARRY AND KILN (18FR332)

### Research Design

It was originally planned to excavated the kiln which had been reported on SHA maps prior to the construction of the existing Route 15. However, the owner, Mr. Leatherman, pointed out that while the kiln was indeed in the position indicated (Fig. 53 )it was buried under the shoulder of the existing road. It was decided not to excavate the kiln because of the problem ot it being buried under the highway and the fact that an excavation would not be tolerated so close to the road strip.

### The 1979 Excavation (Fig. 53 )

A backhoe excavation was cut into the site for approximately 30 feet up against the face of the limestone quarry. The cut revealed the stone floor of the quarry 3 feet below the surface. The soil above the floor was a dark organic muck resulting from the pond which the owner indicated had occupied the center of the quarry excavation. Fragments of limestone resulting from the quarrying process littered the base of the excavation. However, no cultural materials were found. The owner indicated that another kiln was to be found across the road from the site on private property. The site predated the life span of Mr. Leatherman who is in his sixties.

### Interpretation

The lack of evenly excavated blocks of limestone suggests that this quarry was not used for building stone, but rather was use to produce lime for fertilizer and for whitewash paint.

### Conclusions

Additional oral history data is needed from this site, which is one of several in the vicinity providing limestone for the surrounding area. There is no evidence to date connecting the site with the Catoctin Furnace specifically.

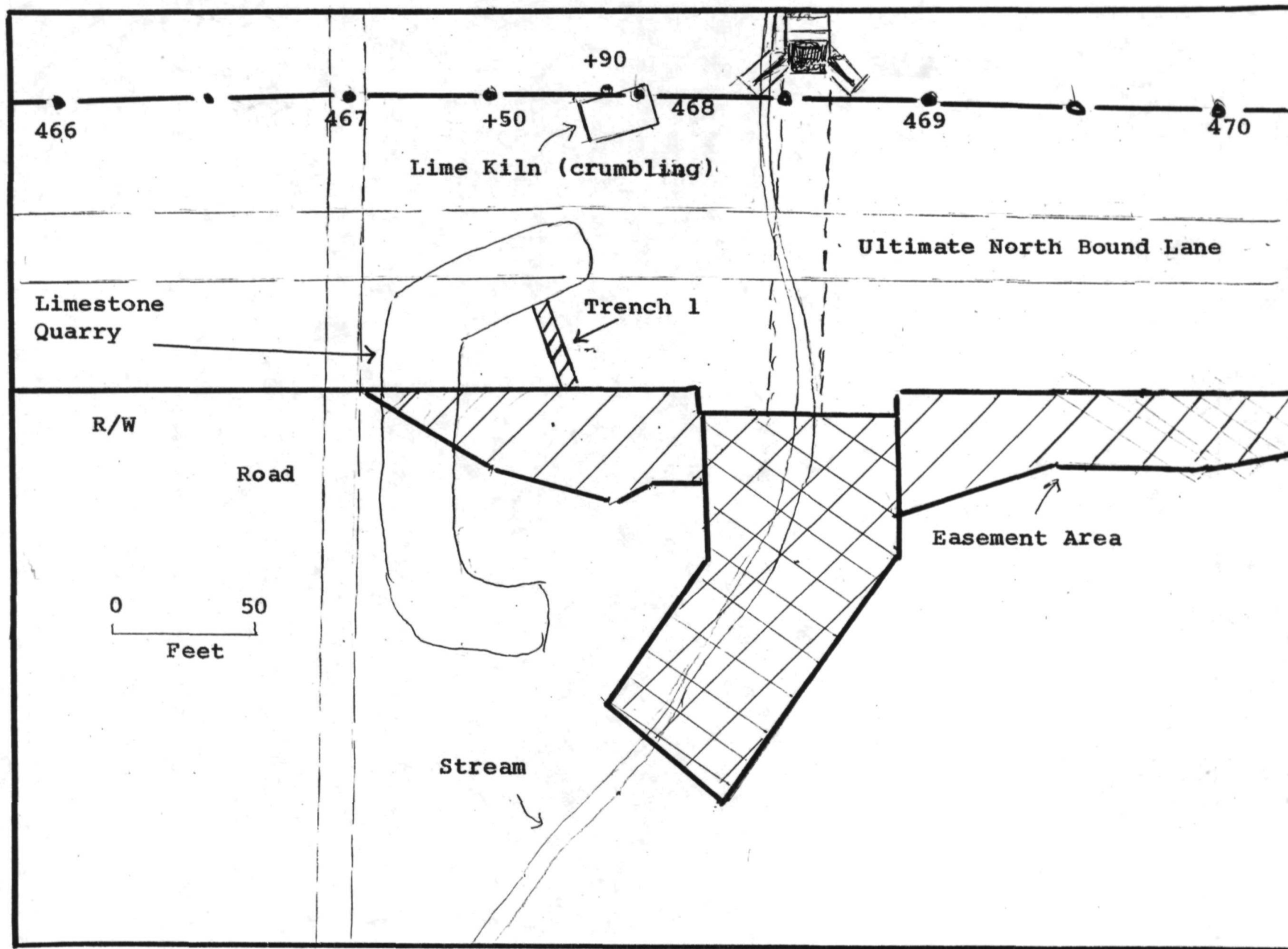


Fig.53.. Ground Plan of Check 19.

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PLATE I. Existing Stacks at Catoctin Furnace: Stack #1, "Whipcrack" at Right; Stack #2, "Isabella" in center; Retaining Wall to Left. (Photo by Norman E. Walsche, before 20 May, 1936. Courtesy of Division of Archeology, Maryland Geological Survey).



A.



B.



C.



D.



E.



F.



G.

PLATE II. Water Power. Source: A, B, Dam #2, Little Hunting Creek; Major Raceways: C, Check 12, Feature 6; D. Check 17, Trench 1. Power Use: E. Auburn Dam and Earlier System A (foreground?); F, Old Forge/Foundry; G, Stone Water Trough (Feature 8, Ck.3).



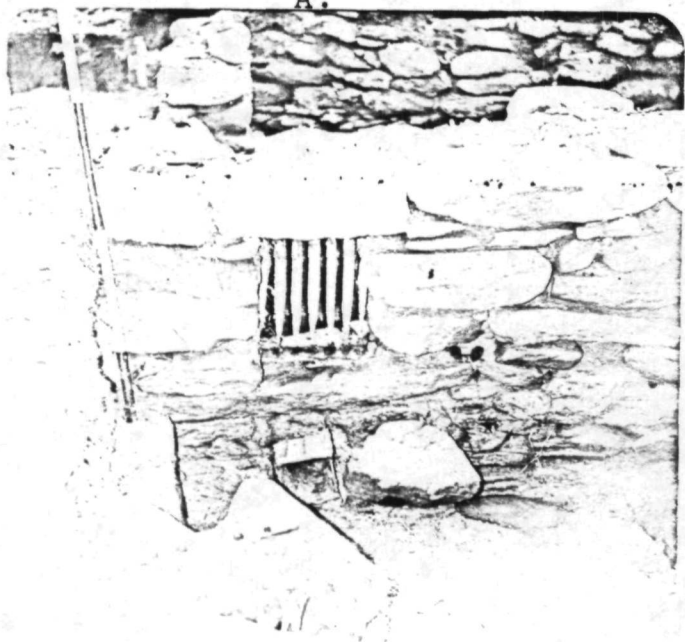
PLATE III. Clem Gardner, Descendant of the Iron Master McPherson-Brien Family and Present Occupant of Auburn Manor examines the catch basin of the Spring-Bathhouse (Feature 1, Check 4). (Photo by Ron Houghton)



A.



B.



C.



D.

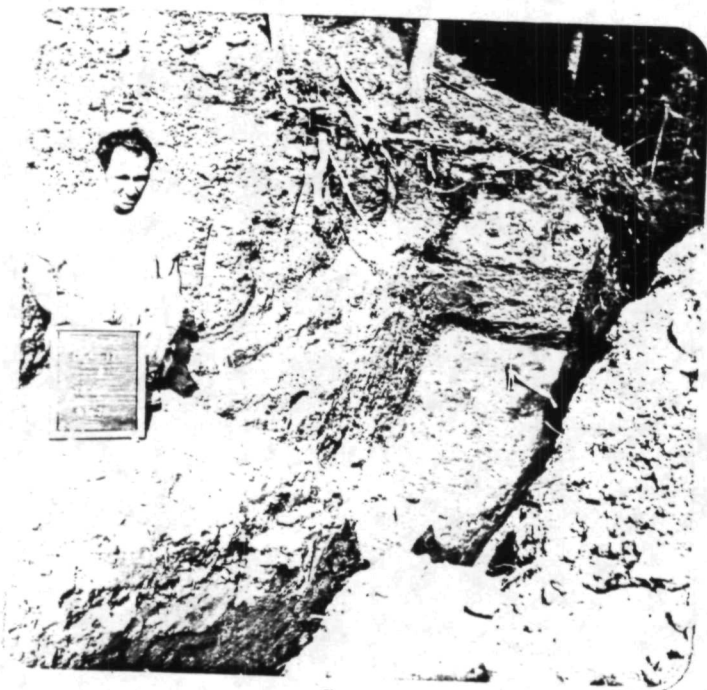
PLATE IV. Check 4. A, Feature 1, Spring-Bathhouse showing massive Flagstones of Bathhouse; B, brick drain and wooden trough; C, Catch basin and exit grill; and D, Retaining Wall of raceways (Systems A,B,C) and recent Tresselt Spring.



A.



B.



C.



D.

PLATE V. A, William Renner, Catoclin Furnace Resident and Historian with Amerindian Finds at Check 5; B(1977); Backhoe Trench at Check 3 conjectured forge site; C, Backhoe-dug Trench 6 at Check 17; D, Core Boring team at Shallow Iron Ore Mine, Check 12, Feature 2.



PLATE VI. Negro Female (?), 11-13 years of age, in Burial dated in the early part of the 19th Century, Check 4, Burial Ground. (Photo by Ron Houghton).

APPENDIX A

THE CATOCTIN FURNACE ARCHAEOLOGICAL  
MITIGATION PROJECT

U. S. ROUTE 15  
PUTNAM ROAD TO ROUTE 77  
FREDERICK COUNTY,  
MARYLAND

REPORT BY THE GEOLOGICAL CONSULTANT

to  
Dr. Kenneth Orr  
Project Director

---

Dr. John L. Fauth  
1 Louise Street  
Cortland, New York

August 13, 1980

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## INTRODUCTION

### Purpose

This report describes the geologic setting and related aspects along the Corridor I alignment for dualization of U. S. Route 15 in the vicinity of Catoctin Furnace, Frederick County, Maryland. It also presents much detailed data obtained as a result of on-site geologic field work and the examination of a number of continuous-sample borings.

Evaluation and interpretation of these data in the context of available geological, archaeological, cultural, and historical information and records are presented to aid in formulating the history of Catoctin Furnace, and to underscore the particular significance of the geological and environmental factors on the origin, development, and eventual demise of the iron industry at this locality.

### Scope

The basic scope of the geologic investigation was originally described in Specifications and Research Designs, The Catoctin Furnace Archaeological Mitigation Project, U. S. Route 15 from Putnam Road to Route 77 (Orr and Orr, 1979, pp. 18-45). The progress and preliminary results of archaeologic and geologic field work in July and August, 1979, justified some modification in the original plan. Consequently, this report focuses on aspects of the following localities: Check 3 (18 FR 320)-Auburn Dam, Check 9 (18 FR 325)-Limestone Quarry, Check 11 (18 FR 327)-Race Pond, Check 12 (18 FR 328) Iron Ore Mines, and Check 17 (18 FR 331)-Raceway.

## Methods and Procedures

### Field Program

Field work, equivalent to 12 man days, was carried out at various locations within the project area during August 1979.

Surface surveys and reconnaissance geologic mapping were employed: (1) to locate, describe, and sample rock outcrops at critical stations, and (2) to determine the areal extent, basic characteristics, and spatial relationship of appropriate major features.

Information obtained by surface surveys at Check 12 (Iron Ore Mines; specifically Features 1 and 2) and Check 17 (Raceway; namely trenches 1, 2, and 3) was augmented by sub-surface data obtained from hand-dug test pits and trenches excavated by backhoe. Those excavations selected for more than cursory study were prepared by shaving smooth one or both walls - first with a shovel and then, if necessary, by hand trowel. Stratigraphic units or elements comprising these faces were delineated on the basis of such physical characteristics as color, particle size or texture, composition, or included cultural material. Where detailed study and sampling were desired, stratigraphic units in these excavations were identified and delimited by numbered index cards attached directly to the "shaven face" and then the face was sketched.

Field sketches of excavations were constructed by "stringing" a level line across the surface at a convenient distance above the excavation to serve as a horizontal reference. At intervals along the level line (usually five feet), vertical measurements were made to boundaries of stratigraphic elements using a six-foot rule or

25-foot tape. This information was plotted, usually at a scale of one inch equal to five feet, in a field notebook. Direct sighting of the exposure aided in extending lines from one plotted data point to another so as to outline the form and extent of each stratigraphic unit and complete the field sketch. Upon completion of the profile sketch, the strata were sampled. Each sample was placed in a plastic bag, numbered, and secured for laboratory examination.

Based upon surface surveys and data obtained from excavations, a program for continuous-sample borings was prepared to obtain additional sub-surface information at several localities. An array of borings was designed and sited within Check 3 (Auburn Dam), Check 11 (Race Pond), and Check 12 (Ore Mines). Wherever possible, each boring penetrated the entire thickness of overburden and extended a minimum distance of 10 feet into bedrock so as to provide samples of all strata that might contain cultural material, reflect human activity, or have geologic significance.

This program was implemented by the Maryland State Highway Administration (SHA) in October 1979 and completed two months later. A total of 31 borings yielded samples representing an aggregate thickness of 1400+ feet of unconsolidated material and rock. These samples, along with the drillers' logs, were transported to Cortland, New York on January 23, 1980.

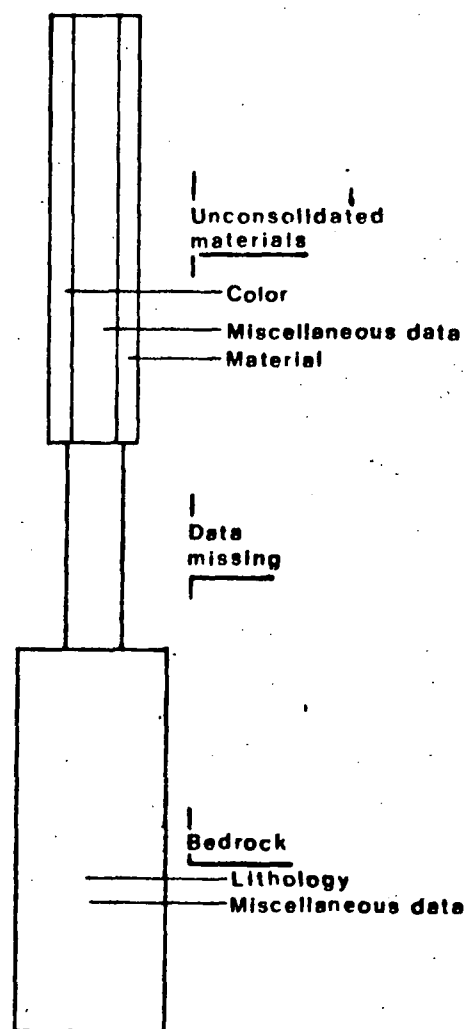
#### Laboratory Program

Cores of unconsolidated materials were split longitudinally or scraped to expose a fresh surface; selected rock samples were sawed lengthwise. All materials recovered in the borings were

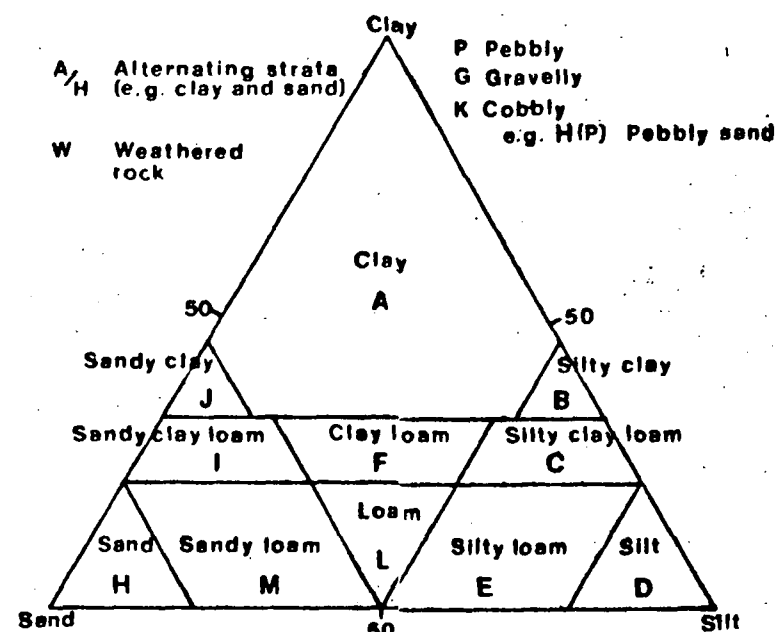
examined, described, and identified megascopically. A binocular microscope and polarizing microscope were used to identify charcoal and slag in the unconsolidated deposits. Specimens of carbonate rock collected from surface exposures (e.g. Check 9-Limestone Quarry) and from the borings were stained using the procedures described by Friedman (in Carver, 1971, pp. 511-530) to distinguish between limestone and dolomite.

Most of the data generated by this project are compiled and presented in a series of cross-sections and profiles. Figure 1 is a comprehensive legend for those diagrams. Basic data on borings taken in conjunction with this study appear in Table 1.

**BORING PROFILE**



**CLASSIFICATION  
OF  
UNCONSOLIDATED MATERIALS**



**MISCELLANEOUS DATA\***

- |                 |           |
|-----------------|-----------|
| ○ Iron granules | ⬡ Pottery |
| ◐ Ore zone      | ⬢ Pyrite  |
| □ Charcoal      | ⬢ Wood    |
| △ Glassy slag   |           |
| ⊠ Brick?        |           |
- \*Stem (e.g. ⊠) indicates extensive vertical distribution

**COLOR\*\***

- |  |
|--|
| Very light gray-medium light gray                    |
| Medium gray-medium dark gray                         |
| Dark gray-olive black                                |
| Pinkish gray-yellow gray                             |
| Grayish orange pink-pale brown-very pale orange      |
| Light brown-moderate brown                           |
| Grayish orange-pale yellow orange-dark yellow orange |
| Grayish brown-dusky yellow brown                     |
| Grayish red-moderate red-dark reddish brown          |
| Dusky red-very dark red                              |

- |                                      |
|--------------------------------------|
| Pale-red-moderate red                |
| Light olive gray-grayish olive       |
| Pale yellow brown-dark yellow brown  |
| Grayish yellow-dusky yellow          |
| Moderate yellow-moderate olive brown |

\*\*Color designations according to: Rock-Color Chart (Goddard et al, 1975)

**LITHOLOGY**

- |  |
|--|
| Quartzite  |
| Limestone  |
| Dolomite   |
| Phyllite   |
| Alternating phyllite and quartzite                 |
| Mudstone   |
| Siltstone  |
| Siltstone with carbonate clasts                    |
| Weathered rock (overprint on lithology)            |
| Rubble; coarse fill<br>Humus or organic-rich layer |

**FIGURE 1. Legend for Profiles and Sections.**

TABLE 1  
Data on 1979 GOW Borings  
Catoctin Furnace Project

Boring Number	Check No.	Site	Surface Elevation (feet)	Total Depth (feet)	Depth to Bedrock (feet)
11	11	Race Pond	515.44	63.0	53.0
12	11	Race Pond	515.65	38.7	>38.7
13	11	Race Pond	513.75**	3.5	>>3.5
14	11	Race Pond	515.53	43.5	33.5
15	11	Race Pond	516.20	41.5	32.5
16	11	Race Pond	516.04	50.0	40.0
17	11	Race Pond	516.42	69.5	49.5
18	11	Race Pond	516.34	59.5	49.5
19	11	Race Pond	517.43	64.0	54.0
20	12	Ore Mine (2)	519.61**	57.5	43.5
21	12	Ore Mine (2)	573.34	58.0	36.3
22	12	Ore Mine (2)	511.82**	24.3	14.3
23	12	Ore Mine (2)	512.16	42.5	36.0
24	12	Ore Mine (2)	518.34	22.0	>22.0
24a	12	Ore Mine (2)	518.10	31.1	26.1
25	12	Ore Mine (2)	523.45	32.6	12.6
26	12	Ore Mine (4)	524.19	66.5	36.5
27	12	Ore Mine (4)	509.40	52.5	22.5
28	12	Ore Mine (4)	523.67	68.8	28.8
29	12	Ore Mine (4)	507.31	26.0	16.0
30	12	Ore Mine (4)	533.95**	31.6	21.6
31	12	Ore Mine (4)	535.73**	37.8	27.8
32	3	Auburn Dam	444.78	59.5	39.5
33	3	Auburn Dam	444.67	43.0	29.3
34	3	Auburn Dam	445.63	42.0	32.0
35	3	Auburn Dam	445.49	51.5	31.5
36	3	Auburn Dam	444.28	36.0	26.0

TABLE 1  
(Continued)

37	3	Auburn Dam	443.85	72.0	12.0
38	12	Ore Mine (4)	516.04	30.2	15.2
39	12	Ore Mine (4)	534.29	42.5	7.5
40	12	Ore Mine (2)	524.00	45.0	34.5
41	12	Ore Mine (2)	519.80**	62.0	52.0

\*\* Surface elevation of GOW boring established by field survey is more than 2 feet from elevation interpolated from base topographic map of project area.

## GEOLOGIC SETTING

The project area lies astride the boundary between the Blue Ridge geologic province, on the west, and the Triassic Lowlands section of the Piedmont geologic province (Figure 2). This position has particular geologic and historic significance because the boundary between the provinces approximates the location of iron ore deposits whose past exploitation determined the site and development of the Catoctin Furnace complex.

Rocks of contrasting character abut along the lower eastern slope of Catoctin Mountain. Quartzites and phyllites of the Weverton and Harpers formation dominate much of the mountainous terrain, whereas bedrock in the adjacent lowland includes carbonate rocks belonging to the Frederick formation, and red mudstones and sandstones of the Newark Group (Table 2). Throughout the Blue Ridge province, deposits of iron ore typically occur wherever quartzites and carbonates are juxtaposed at the foot of mountain slopes. At the base of Catoctin Mountain in Maryland, the only significant iron ore deposit identified is "the large and important occurrences on what is known as the Catoctin property" (Singewald, 1911, p. 193), a factor which influenced the history of the iron and steel industry throughout much of this region during the eighteenth and nineteenth century.

TABLE 2

IMPORTANT ROCK UNITS IN THE VICINITY OF  
THE CATOCTIN FURNACE PROJECT AREA (from Fauth, 1977a)

<u>Rock Unit (Age)</u>	<u>Description</u>
Colluvial fan deposits (Quaternary)	Mixed colluvial and alluvial debris consisting of large and small rounded boulders, cobbles, pebbles, and sand derived from quartzite, and to a lesser extent, from metabasalt and meta-rhyolite. Distal margins are dominated by sand and silt mixed with fragments of underlying red sediments of the Newark Group. Thickness varies both longitudinally and transversely across the deposits. Maximum drilled thickness 150-200 feet.
Newark Group (Triassic)	<p>In general, poorly bedded, grayish red, reddish brown, and moderate red mudstone and thin-bedded shale. Subordinate interbeds of grayish red, laminated and cross-laminated siltstone and fine-grained sandstone.</p> <p>In the area of Creagerstown Station, includes very thin to thin-bedded, grayish red, micaceous, silty mudstones and local intervals of medium greenish gray, poorly bedded, argillaceous siltstones.</p> <p>Locally a conglomerate or fanglomerate principally composed of subangular to subrounded clasts of gray-colored limestone floating in a reddish brown, calcareous, argillaceous to sandy matrix. Also includes minor amounts of fine-grained sandstone with quartz pebbles 2.0-5.0 mm in diameter. Clasts typically comprise 30-75% of rock. Occurrence local; thickness variable. Maximum exposed thickness 5-8 feet.</p> <p>The base and top of the Newark Group are not exposed. Thickness is estimated to be in excess of 10,000 feet.</p>
Frederick Formation (Cambrian)	Lime Kiln Member. Exposures uncommon. Principally fine-grained, thin-bedded and laminated, light gray limestone. Contains moderately abundant sand and silt-size fossil debris.

TABLE 2  
(Continued)

<u>Rock Unit (Age)</u>	<u>Description</u>
Frederick Formation (Cambrian)	<p>Adamstown Member. Exposures adjacent to the Monocacy River include regularly bedded, thin-bedded, dark gray, argillaceous to silty limestone, and interbedded medium gray limestone and yellowish gray to light olive gray silty limestone. Thin intervals or individual beds of limestone are commonly separated by very thin, dark gray, argillaceous or silty partings. Light to medium light gray, micritic limestone also occurs.</p> <p>Rocky Springs Station Member. Medium to dark gray, very finely crystalline limestone. Characterized by light brown, dusky yellow or grayish orange silty partings and laminations. Overlies dark gray, very thin bedded to fissile, pyrite-bearing, calcareous shales. Crops out in the valley area north of Thurmont. Exposures south of Catoclin Furnace are very light to light gray to very pale orange, massive and poorly bedded dense limestone and peloidal limestone.</p> <p>The estimated thickness of the entire formation is 2700 feet.</p>
Harpers Formation (Cambrian (?) )	<p>Basal part: Orange and brown weathering, light gray to yellowish gray phyllites and quartz phyllites overlain by light gray to dark gray, lustrous phyllite that contains discontinuous bands of elongated pebbles (?) of light to medium light gray quartzite 2.0-10.0 mm thick.</p> <p>Upper portion: thin to medium-bedded, olive gray to moderate olive brown, very fine grained graywacke and graywacke siltstone. Dark gray to black laminae occur at intervals of 5.0 - 25.0 mm. Light gray phyllite and darker, greenish gray to medium bluish gray phyllite and phyllitic graywacke also occur. These rocks are characteristically finely laminated, and weather to shades of yellowish gray and greenish gray.</p> <p>The thickness of the Harpers Formation is estimated as 300-500 feet.</p>

TABLE 2  
(Continued)

<u>Rock Unit (Age)</u>	<u>Description</u>
Weverton Formation (Cambrian (?) )	<p>Upper member contains a local, basal ferruginous quartzite and conglomerate which is characteristically medium to thick-bedded, moderate to poorly sorted, and laminated and cross-laminated. Fresh rock is medium bluish gray to light gray; weathering colors range from moderate orange pink to pale red brown. Succeeded by light gray to greenish gray, medium-bedded, medium to coarse grained, graywackes, protoquartzites, and quartzites. Interbeds of light gray and medium light gray to olive gray phyllite and quartz phyllite at irregular intervals. Thickness is approximately 150-250 feet.</p> <p>Middle member of "ledge-maker" quartzite. Prominent thick-bedded to massive, well-jointed, medium to coarse-grained quartzite. Generally very light to medium gray on fresh surface; weathers light gray, grayish red, or grayish orange pink. Contains 2.7% subrounded, blue and gray quartz pebbles 2.0-4.0 mm in diameter. Near top of unit, quartzites contain dark red brown to very dusky red, hematite-bearing laminae and cross-laminae.</p> <p>Thickness ranges from 50 feet or less near Mountindale to approximately 110 feet in Thurmont Area.</p> <p>Lower Member. Mainly medium-bedded, light greenish gray to greenish gray, pebbly, quartzose graywacke and graywacke conglomerate interbedded with dark-colored phyllites. Pebbles mostly sub-angular, blue and gray quartz, and flattened, grayish purple and dusky blue phyllite. These rocks usually have dark blue and purplish thin bands and irregularly spaced streaks parallel to bedding. Upper two-thirds is dominated by medium gray to bluish gray weathering, fine to medium grained, quartz phyllite, interbedded with light greenish gray to greenish gray, pebbly quartzose graywacke and protoquartzite. Cross-laminated in places. Estimated thickness is 250-275 feet.</p>

## COMPONENTS OF THE STUDY

### Check 3 - Auburn Dam (18 FR 320)

#### Background

Portions of the Auburn Dam presently identifiable include nearly orthogonal earthen embankments that extend approximately 100 feet northwest and 150 feet northeast from a common junction. These embankments, about seven feet in height, are situated at the south end of a basin which provided water to power the earliest forge located at the Catoclin Ironworks (Orr and Orr, 1977, pp. 4-17; John Milner Associates, in Orr, 1979, pp. 7-8).

#### Data and Observations

The substrate within the basin north of the Auburn Dam was sampled using an array of six borings. The configuration of the borings and nature of the strata penetrated by them is graphically presented in Plate 1.

Brown-colored clay and sand with an aggregate thickness of 1.5-3.5 feet mark the uppermost section of all borings from Auburn Dam (Plate 1). Bits of charcoal, distinguished by its reflectance, softness, and structure, are abundant and distributed throughout much of the clay and sand. Glassy slag, in contrast, is restricted to the thin bands of fine-grained sand. Grains of slag are distinguished from quartz because glassy slag is isotropic under the polarizing microscope and quartz is not. The greenish color, numerous dark (iron?) inclusions, and the presence of tiny vesicles in some grains also aid in identifying the slag.

A succession of red-colored silt and clay occurs beneath the uppermost interval of sand and clay, and extends to bedrock at

depths of 12-40 feet below the land surface. The contact between the brown and red sections is generally sharp and clear, although some interlayering is present in Borings 33 and 37. With the exception of a charcoal-bearing zone about 0.15 feet below the brown-red contact in Boring 37 (Plate 1), charcoal and slag are not observed in the red strata.

The bedrock in the area nearest the embankments at Auburn Dam (Plate 1, Borings 32, 36, 37) is primarily red mudstone and siltstone of the Newark Group of Triassic age. However, limestone, which is present in limited thickness in Boring 32, becomes progressively more abundant away from the dam (Borings 32-35). The limestone is probably part of the Frederick formation of Cambrian age.

#### Evaluation

The red silt and clay are strata derived from the underlying bedrock and formed essentially in situ as a result of weathering and soil-forming processes. The abrupt contact between these materials and brown, fine-grained sand near the top of the section is believed to mark the original bottom of the pond behind the Auburn Dam.

The sequence of sand and clay above the base of the pond which contains fragments of charcoal and slag, as well as small, rounded granules of iron, clearly has been derived from an off-site source and transported to the pond site. Visual comparison of these strata and sand samples obtained from trenches incising the raceway at Check 17 suggests that they are similar not only in grain size and mineralogy, but also in the occurrence of charcoal

and glassy slag. As a result of this similarity in character, a question arises --- is the sand in the raceway and Auburn Dam the result of progressive filling of both features, or does the sand behind Auburn Dam represent accumulated sediment derived from the erosion and subsequent down-channel transport of material used to construct and maintain the raceway?

Check 9 - Limestone Quarry (18 FR 325)

Background

This feature, a box-like depression approximately 40 x 50 feet at the base and 7-10 feet deep, was uncovered and identified during the Intensive Survey as a probable limestone quarry (Orr and Orr, 1977, p. 40).

A rock exposure forms most of the west face of the quarry(?). This outcrop was examined by this consultant during the 1977 study. Based upon field study, and petrographic and chemical analyses performed by the Maryland State Highway Authority (SHA) and reported to Orr and Son, Consulting Archaeologists (Orr and Orr, 1977, Table 1 and 3), this rock was termed a siliceous limestone - a carbonate rock which contained fairly abundant sand and silt-size quartz plus nearly four percent iron. As a result, this consultant concluded that the rock in the quarry(?) probably was unsuitable for flux owing to the amount and nature of the impurities, although it may have been prospected and tested for such purpose (Fauth, 1977, p. 7).

### Data and Observations

Limited trenching and excavating increased the amount of rock exposure within the quarry(?) by uncovering bedrock at various places on the floor of the feature, and near the base of the north wall. Nonetheless, the outcrop which comprises the west end of the quarry remains as the most extensive exposure of rock.

In general, the bedrock at this site is a dense, massive, very finely crystalline carbonate. The typical, medium light gray to medium gray color of the rock is altered to pale yellow orange or grayish brown on poorly exposed fracture surfaces; on well-exposed joint faces more thorough weathering yields a yellowish gray to grayish orange color. A mantle of moderate brown to red-brown silt loam of variable thickness overlies bedrock at this locality. Incorporated in the silt loam are chips of lustrous gray phyllite, and fragments of charcoal. Most of the charcoal is concentrated in the eastern portion of this feature.

Samples obtained from the base, middle, and top of the west wall of the quarry(?) were prepared and stained to determine the mineral composition of the rock. Using procedures outlined by Friedman (in Carver, 1971, pp. 511-552), stains capable of distinguishing between calcite  $[CaCO_3]$  and dolomite  $[Ca,Mg (CO_3)_2]$  were applied. In all cases positive results were obtained when using the dolomite-sensitive stain, and only a negative reaction occurred where the calcium-sensitive stain was used. Based on the results, the rock exposed in the quarry(?) is a dolomite - a rock consisting of more than 50 percent carbonate material of which more than half is the mineral dolomite.

### Evaluation

Based on earlier field work and a review of the chemical analysis of one sample from this locality (Orr and Orr, 1977, Table 1), the rock was identified as limestone (Fauth, 1977, p. 7). However, staining unequivocally demonstrates that the rock is dolomite, a rock type common in the Lower member of the Frederick formation (Reinhardt, 1974, pp. 1-18) which locally crops out along the foot of Catoctin Mountain.

What is the origin and nature of the feature at Check 9, and for what purpose(s) was the stone quarried? Root (1971, p. 62, Table 1) summarizes the general chemical characteristics of rocks suitable for flux as follows:

Limestone and magnesium limestone  
for steel flux (blast furnaces)

Silica ( $\text{SiO}_2$ )	5%
Alumina ( $\text{Al}_2\text{O}_3$ )	2%
Magnesium carbonate	8.32%
Phosphorous	0.01%

Limestone for steel flux  
(open hearth)

Calcium carbonate ( $\text{CaCO}_3$ )	98%
--	-----

Although the product of the blast furnaces at Catoctin Furnace was iron and not steel, the limits cited above provide an approximation of the requisite chemical characteristics of limestone and dolomite suitable for flux. To this extent, the chemical analysis of one sample from Check 9 (Orr and Orr, 1977, Table 1) indicates that the dolomite is acceptable. However, other characteristics of the rock may detract from its suitability or make it unsuitable.

One is the relatively high percentage of insoluble residue in the rock; mainly quartz ( $\text{SiO}_2$ ) (Orr and Orr, 1977, Table 3). Another is the presence of small crystals and grains of pyrite ( $\text{FeS}_2$ ) disseminated throughout the rock. Both the quartz (silica) and the sulfur derived from the pyrite are impurities in the blast furnace charge, and as such are removed by combination with the bases provided by the flux. Utilizing an impure carbonate rock for flux increases the quantity of impurities that must ultimately be removed. Thus, "the percentage of iron per ton of material put into the furnace is decreased, and the yield of the furnace per unit of capacity reduced" (Singewald, 1911, p. 125).

Based on available data, the dolomite exposed at Check 9 could be used as a flux, although its quality would likely be marginal. However, the limited dimensions of the quarry(?) at this site suggest that although the rock may have been prospected and tested for fluxing properties, it was not extensively used for that purpose in the blast furnaces at Catoctin Furnace.

#### Check 11 - Race Pond (18FR327)

##### Background

"Several factors determined the locations of the ironworks. An adequate supply of ore, an abundance of wood, sufficient water power, . . . , were essential for the successful operations of these early industrial plants." (Bining, 1938, p. 49). Race ponds, raceways, and sluices were integral components of eighteenth and nineteenth century iron furnace complexes because water power was the energy form used to turn the large waterwheels which operated

the bellows, and thus provided blast to the furnace. An earlier study concluded that prior to 1876, Furnace Stacks 1 and 2 at Catoctin Furnace were totally dependent upon a system of water-courses, races, and ponds located northwest of the furnace site (Contract Archaeology, 1971, p. 56). By 1876, the introduction and use of steam power for blast radically altered the need for water power, and made race ponds less important.

The pond situated within the Check 11 area is the surviving remnant of a larger race pond that stretched eastward to a discharge point under a portion of the present highway. Construction of the existing alignment of U. S. Route 15 placed an overlayment of fill, 8-10 feet thick, over approximately the eastern two-thirds of the original water body. This race pond was a major source of water power for "the water wheels of most of the known iron-working structures and a grist mill" at Catoctin Furnace (Orr, 1979, p. 29). Perhaps this pond was first utilized for water when furnace operations began in about 1775. Oral history is not consistent on this point; instead, some elements suggest that the site was originally an iron ore mine, and/or an ore-washing pond before it functioned as a race pond.

#### Data and Observations

A double line of continuous sample borings oriented approximately 030° and sited between the existing pond and the adjacent shoulder of U. S. Route 15 was used to obtain subsurface information at this locality. In addition, the driller's log for a 1977 boring located within the pond provided data to a depth of

50 feet below the sediment-water interface. Basic characteristics of the bedrock and its overburden observed in these borings are summarized in Plate 2.

Hand-dug trenches and shallow test pits were completed in the area north of the present Race Pond. A number of these excavations yielded abundant slag, and at least one trench produced assorted cultural material. A backhoe trench incised fill probably emplaced during the construction of the present roadway. Unfortunately, material exposed by the backhoe could not be examined in any detail because infiltration of ground water caused continuous sloughing of the trench walls creating hazardous working conditions. This excavation was located in the vicinity of Boring 11 (Plate 2).

Seven of the ten borings taken at this site penetrated bedrock (Table 2; Plate 2). Rock is encountered 32-54 feet below land surface, and consists of quartzite and phyllite intervals of various thickness; nowhere in these borings is carbonate rock present. A mineral commonly associated with both rock types is pyrite; an iron sulfide ( $\text{FeS}_2$ ). It occurs as single cubic crystals or as a fine, granular aggregate filling small fractures.

In general, the bedrock surface is deepest toward the northeast and rises in a gradual, ramp-like fashion toward the southwest. A pair of borings at the south end (14 and 15), and another set at the north end (11 and 19) show there is little change in the depth to bedrock transverse to the double-line of borings (Plate 2).

As noted in earlier reports (Mentzer, 1974, p. 3; Orr and Orr, 1977, pp. 48-49, Figures 16 and 17), the original race pond extended

eastward a considerable distance. However, the eastern two-thirds of the pond was impacted by the construction of the present U. S. Route 15, and an overlayment of fill, 8-10 feet deep, reduced the pond to approximately its present size. In the borings, this fill is generally characterized by deep red or grayish red silt and clay, or by coarse quartzite and phyllite rubble (Plate 2). Another, deeper fill occurs below the "red-colored" material. This deposit is recognized and differentiated on the basis of its non-red color and the presence of charcoal, slag, or wood (construction lumber or timbers) fragments. Together these two fills have an aggregate thickness of 19 and 22 feet in borings 18 and 19 respectively.

A layered sequence dominated by light-colored clay and silt of uncertain origin generally overlies the bedrock at this locality. Scattered, small granules of iron are common in this clay-silt succession, but dark yellow-brown zones rich in iron oxide are thin and only developed locally. Typically this clay-silt interval exhibits a sharp contact with the overlying fill material (Plate 2).

### Evaluation

The quartzites and phyllites, which comprise the bedrock at the Race Pond locality, have physical characteristics most similar to rocks that occur in the uppermost Harpers formation of Cambrian(?) age. The existence of this rock unit in the immediate subsurface is consistent with geologic relationships established by recent bedrock mapping (Whitaker, 1955; Fauth, 1977a) which projects the Harpers formation across most of the lower eastern slope of Catoclin Mountain.

The pond which characterizes the Check 11 area is identified as a race pond because its former outlet to the east is a channel or raceway which runs southward to the furnace(s) and beyond.

However oral history offers testimony to suggest that the site may have been an ore mine originally, and/or an ore washer pond at some time in Catoctin history (Orr, 1979, p. 29). Examination and interpretation of the boring profiles appear to offer some insight as to the nature and history of this feature as well as these alternate uses.

At an 18th and 19th century iron furnace complex, a race pond would provide a continuous, regulated flow of water by gravity via races to the water wheels located at the blast furnace(s) and associated operations. To function in this manner at Catoctin Furnace, the race pond at Check 11 would have to impound water at an elevation greater than its outlet to the race course and above the top of the overshot water wheel which operated the bellows at the furnace(s). A trench transecting the raceway immediately across the highway from the existing pond apparently exposed the base of the channel at a depth approximately 10-12 feet below the top of the adjacent embankments. Estimating the elevation of the embankment from the topographic base map (Map, Inc., 1978; scale: 1/600, contour interval two feet) as 522-523 feet, the bottom of the race should lie at 510-513 feet. Therefore, the bottom of the race pond should occur some 3-6 feet below the general water surface level of the existing pond. Deepening the pond by lowering its base would not significantly increase the effectiveness or capacity of the impoundment unless the water is pumped into the nearby race; an

unlikely possibility during the Colonial period since a furnace in blast operated around the clock for periods of one week or more, and would require water power throughout this time.

The data provided by the borings taken at this site establish that fill exists to a minimum depth of 18-22 feet below present land surface in at least two places within the limits of the original race pond (Plate 2). Thus the bottom of the depression occupied by the race pond, at least locally, is between 494 and 498 feet in elevation; some 12-19 feet below the level necessary to provide gravity flow into the nearby race. If the distinction between fill and indigenous unconsolidated material based on the rate of penetration of a split-barrel sampler is accepted, the drillers' logs for several borings at this locality indicate the base of the original depression may be at greater depths; between 25-30 feet below the present land surface, or at elevations of 486-491 feet. In either case, data seem to indicate that the base of the original pond lies at a depth measurably greater than is required for a simple race pond.

Perhaps the "over-deepened" pond occupies a natural depression? Examination and study of the Catoctin Furnace 7½-minute topographic map and selected aerial photographs reveal no evidence that natural depressions of similar size, shape, and depth exist anywhere in the general vicinity of the Catoctin Furnace area. Consequently, an alternative proposition must be evaluated - the race pond occupies a site either modified or constructed by human activity.

Figure 3 is a portion of the topographic base map for the project (Maps, Inc., 1978) centered about the Check 11 locality. The rectilinear line segments (A, B, and C) and the near-orthogonal bends (X, Y, and Z) in the contour pattern clearly contrast with the configuration of the contour lines elsewhere in the map area. The contour lines west of the existing pond at Check 11 define a boxlike form which, at a larger scale, is replicated at the ore mine one mile north of the Check 11 site (Singewald, 1911, p. 194, Figure 3), and at a similar scale is recognizable within the confines of Feature 1, Check 12; an ore mine immediately south of the Race Pond site.

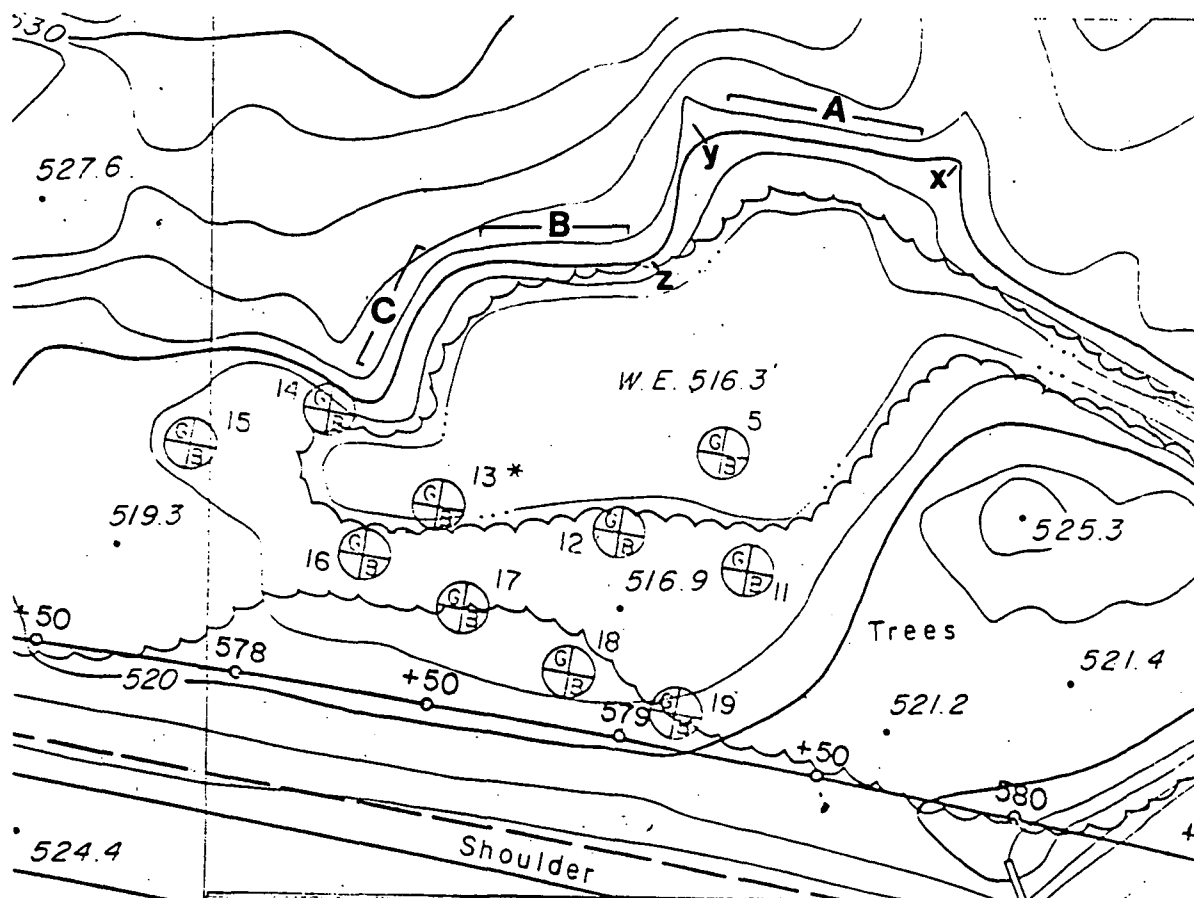


Figure 3

Configuration of contour lines about existing pond at Check 11. Note rectilinear segments (A, B, and C), and almost right angle bends (X, Y, and Z).

On the basis of the "box-cut" character of the topography at the western margin of the existing pond at this check, the excessively thick fill and probable depth to the base of the original depression, and the documented existence of ore mines to the immediate south and east of this locality (Orr and Orr, 1977, p.50), it appears probable that the Race Pond at Check 11 occupies the site of an earlier iron ore mine.

Examination of the cores obtained by the borings located east of the existing pond contributes little evidence as to whether or not the Race Pond served as an ore-washing site. The almost uninterrupted succession of yellow, orange, and brown clay and silt which overlies bedrock in this locality may represent sediment accumulated from an ore-washing process. However, no criteria have been identified to differentiate between "in situ" clay in the cores and that derived from washing iron ore or other processes. Consequently, one can only speculate on the origin and significance of these silts and clays.

The boring profiles presented in Plate 2 suggest that the thickness of the light-colored silt-clay sequence increases to the north and east. If an ore washer was located at this site, possible evidence of its existence might be found in the shallow subsurface just north of the pond and the greatest thickness of "accumulated" sediment. Ore washed at this locality would probably have its source north or east of the site and close to the washer pond.

If one accepts the interpretation that the Race Pond at Check 11 was originally the site of an ore mine, then several questions arise; such as: (1) when did the mine originate?, (2) when was the race

pond established(?); and (3) where was water obtained to power the water wheels if the Check 11 area was an active ore pit?

For the time period of active mining at the Race Pond site, some insight may be obtained by the description by Alexander (1840, in Singewald, 1911, p. 146) that the original Catoctin Furnace, built in 1774, was replaced in 1784 by a furnace stack (Stack #1) located "...about three-quarters of a mile further up Little Hunting Creek, and nearer the ore banks." The ore banks referred to in Alexander's work might be those astride the present alignment of U. S. Route 15 and north of Catoctin Hollow Road (Check 12, Features 1, 2, and 3), including one at the Race Pond site (Check 11). If the Deep Ore Mine (Check 12, Feature 4) or the Big Ore Bank (Check 13) were being referred to in this description a term indicating a closer proximity to the ore banks would have been used. Additionally, these larger ore banks "back of the furnace" probably weren't developed extensively until 1831 when Stack #1 was enlarged and its capacity increased from 600-900 tons per year to 1700 tons per year, or perhaps later, in 1856, when the Isabella furnace (Stack #2) was constructed and the output of the Catoctin Iron Works jumped to 5,000 tons of pig iron per year (Lesley, 1859, in Contract Archaeology, 1971, p. 37).

Undoubtably a water source north of the furnace site provided water power to drive the water wheel for Stacks 1 and 2 (Isabella). If the Race Pond (Check 11) was an active ore mine during the Early Catoctin Period (1774-1787) and, perhaps, the first phase of the Middle Catoctin Period (1787-1873), a water supply may have been

acquired directly from Little Hunting Creek, or from an, as yet, unidentified race pond located nearby. Most likely, the Race Pond site was no longer an active mine after the early 19th century.

### Check 12 - Iron Ore Mines (18 FR 328)

#### Background

The area encompassed by Check 12, located northwest and west of the furnace site, is dominated by a series of ore pits and ore banks. The existence of the ore mines, known to the older residence of the area and part of the oral history of Catoctin Furnace, generally was unreported in archaeological studies prior to the Intensive Survey (Orr and Orr, 1977, p. 50). Three ore mines lie wholly or partially within the expected area of impact by construction of Alignment 1. Collectively these features are thought to be representative of ore mines and mining methods that span most of the iron-working history at Catoctin (Orr, 1979, p. 32). In addition to ore mines (Features 1, 2, and 4), portions of the Raceway (Feature 5), and the Charcoal Road (Feature 6) lie within this Check.

#### Data and Observations

Feature 1: Shallow Ore Mine (West) - This feature is located west of center line stations 575-577. It is an "L-shaped" depression about six feet below present road level that extends westward about 160 feet, and then southward for an additional 90 feet (Figure 4).

The ore mine was explored mainly by trenching. Particularly significant data on the mine was obtained from a set of three backhoe trenches that formed a "Z-shaped" pattern and were located near the

entrance to the feature. This trench system partially coincides with a set of excavations developed during the Intensive Survey (Figure 4).

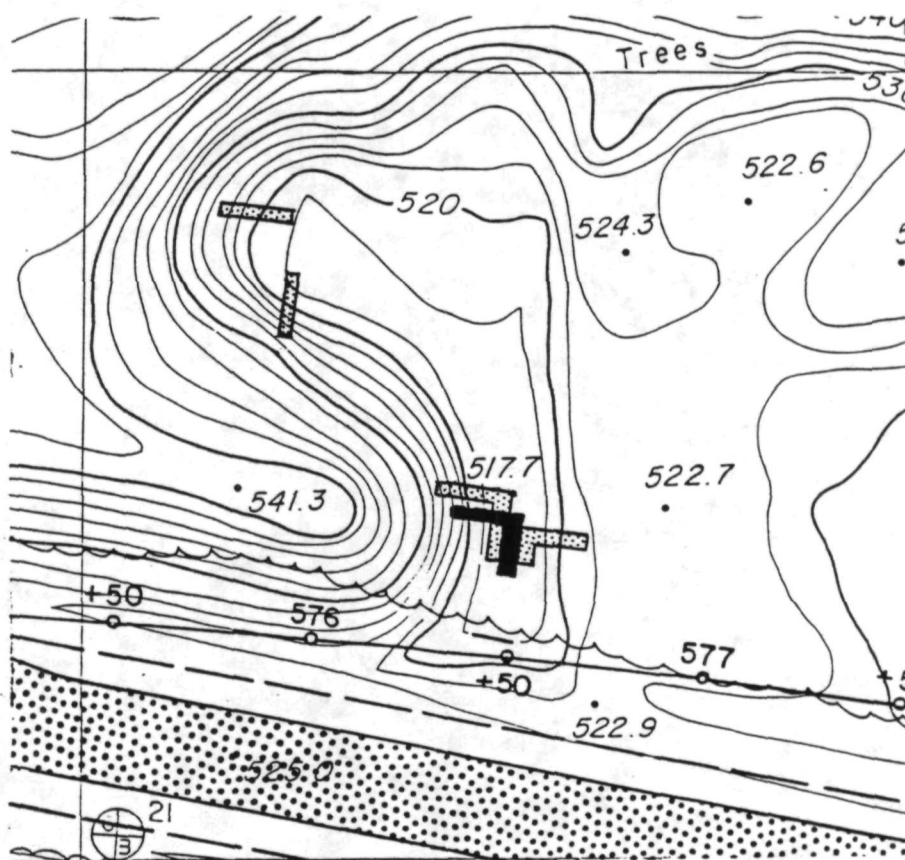


Figure 4

Topographic character of Check 12, Feature 1: Shallow Ore Mine (West) shows 1977 trenches (black) and 1979 trenches (stippled). Scale 1" = 50'

The array of backhoe trenches at this site exposed iron ore-bearing strata beneath the slopes immediately north and south of the entrance to the mine. These strata rest on an interval of banded clay of unknown thickness. The clay, probably a saprolite (residual material derived from rock directly beneath), and the superjacent ore zones are sharply truncated and overlain by a succession of "fills." The stratigraphy in the north-south trenches is diagrammed in Figures 5 and 6.

Figure 5

No vertical exaggeration

CHECK 12 FEATURE 1A  
LIRE MINE

Profile East Wall  
Trench 3

Scale 1:40

Based on field sketch  
and descriptions

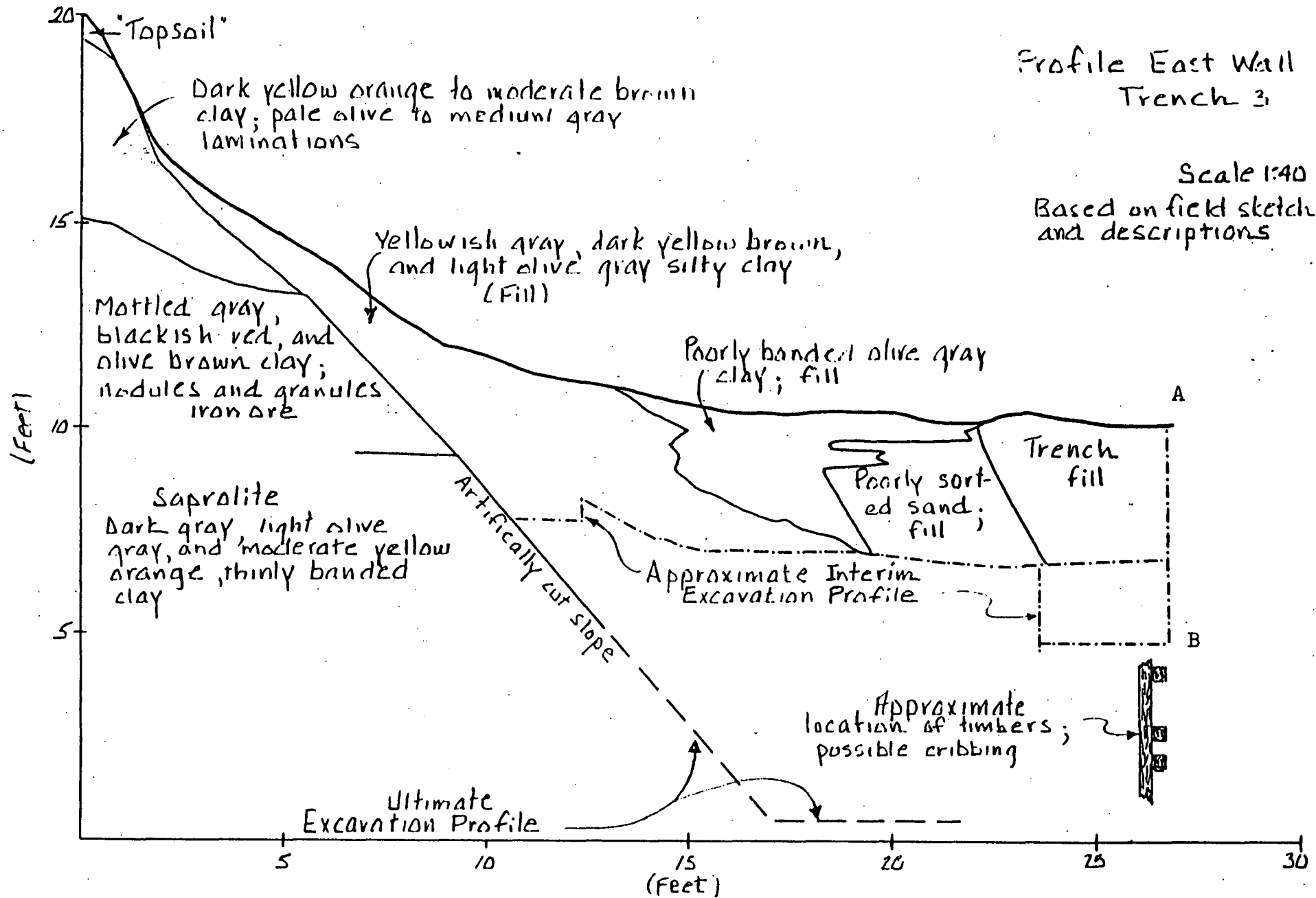


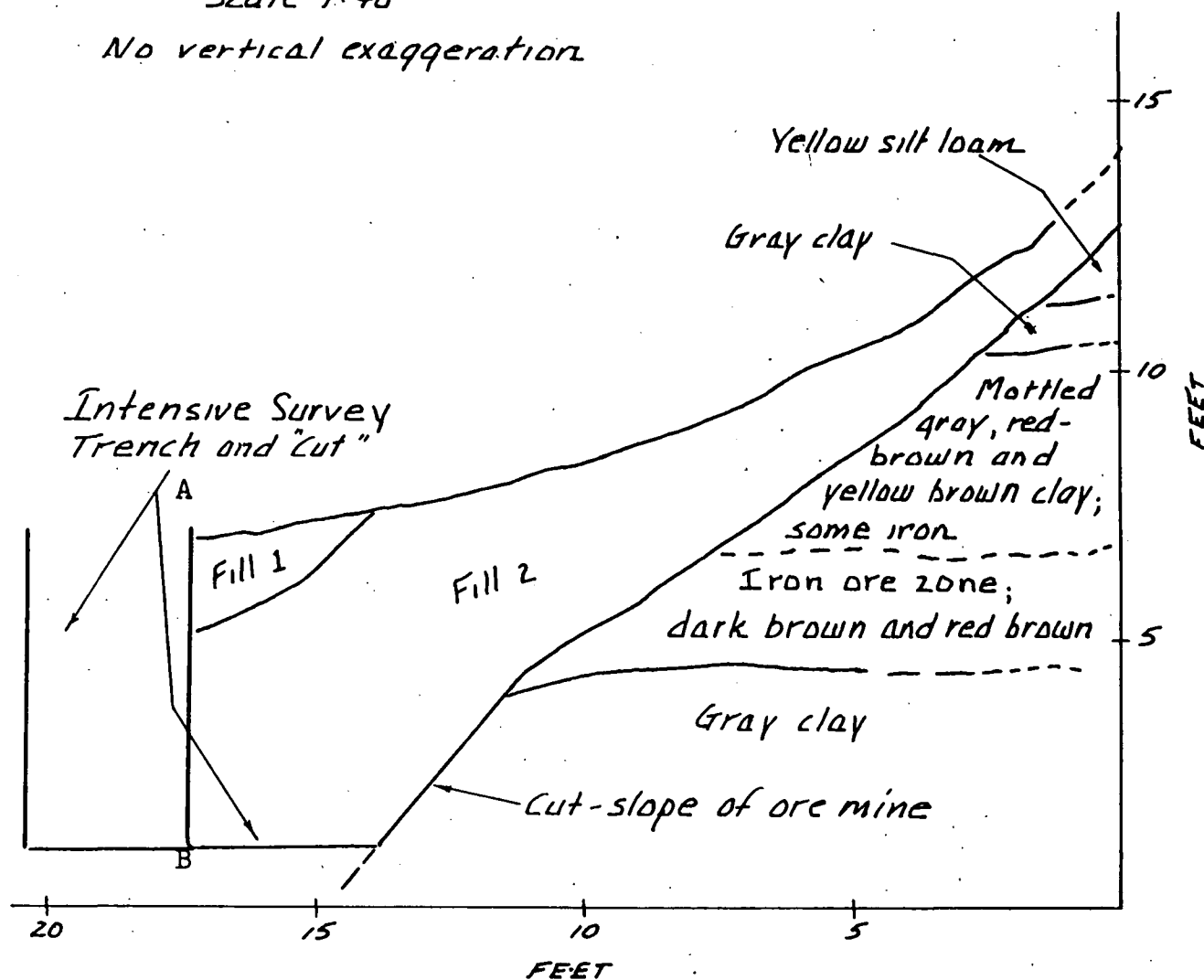
Figure 6

CHECK 12 FEATURE 1 : ORE MINE

Profile East Wall Trench 2

Scale 1:40

No vertical exaggeration



Limited trenching to shallow depth in the southernmost part of this feature (Figure 4) revealed the occurrence of very plastic poorly banded, olive gray clay similar to material comprising part of the fill exposed in the excavations near the head of the mine.

Feature 2: Shallow Ore Mine (East) - The ore mine is a near-rectangular topographic feature about 300 feet long and 40-50 feet wide that is located just to the northeast of the junction of Catoctin Hollow Road and U. S. 15 (Figure 7). The northern end of this mine is directly opposite and widens toward the entranceway of Feature 1 (ore mine).

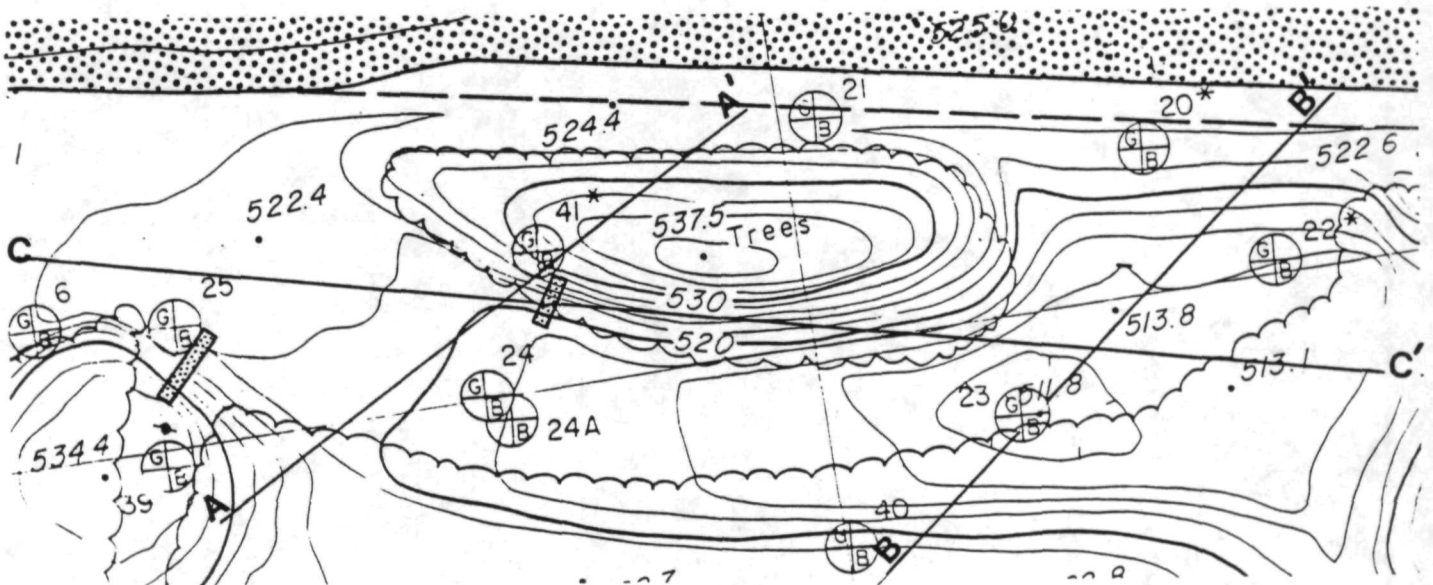


Figure 7

Topographic expression of Check 12, Feature 2: Shallow Ore Mine (East); location of 1979 trenches (stippled), borings, and interpretive cross-sections; AA', BB', CC'.

The recent history and use of this mined area is given in Orr and Orr (1977, p. 51). To probe into the nature and potential resources of this ore pit, two backhoe trenches were incised into

opposing slopes located near the southeast end of the feature.

In addition, 10 continuous-sample borings were taken within and adjacent to the mine. The driller's log for another boring, part of an earlier study, was also available for examination. The approximate location of the trenches and specific position of each boring is displayed in Figure 7.

All but one boring (#24) at Feature 2 penetrate bedrock. Except for the western part of the feature where bedrock generally consists of quartzite and phyllite, the remainder of the area is underlain by dolomite associated with very local and limited thicknesses of limestone (Plate 3). Boring 6, an exception to this general pattern, encountered phyllite and minor amounts of quartzite near the southeast corner of the ore mine. Plate 3 presents the basic data on the bedrock and main characteristics of the overburden at this site.

The boring program and the backhoe trenches excavated at this Check clearly demonstrate that iron deposits still remain in portions of this site. The ore zone(s) and stratigraphy of Trench 1 are represented in Figure 8. This excavation yielded masses of nodular iron ore 10-15 inches in diameter and weighing up to a few tens of pounds. In Trench 2 (Figure 9), located on the opposite side of the mined area from Trench 1, only traces of iron ore occur.

The configuration of the bedrock surface at this locality is shown in a series of diagrams (Figure 10; A, B, C) and also on Plate 3. The extent of fill material, principally recognized on the occurrence of charcoal fragments in the overburden, is also identified in these diagrams.

CHECK 12 FEATURE 2  
DRE MINE

Profile North Wall  
Trench 1

Scale 1:40

Based on field sketch  
and descriptions

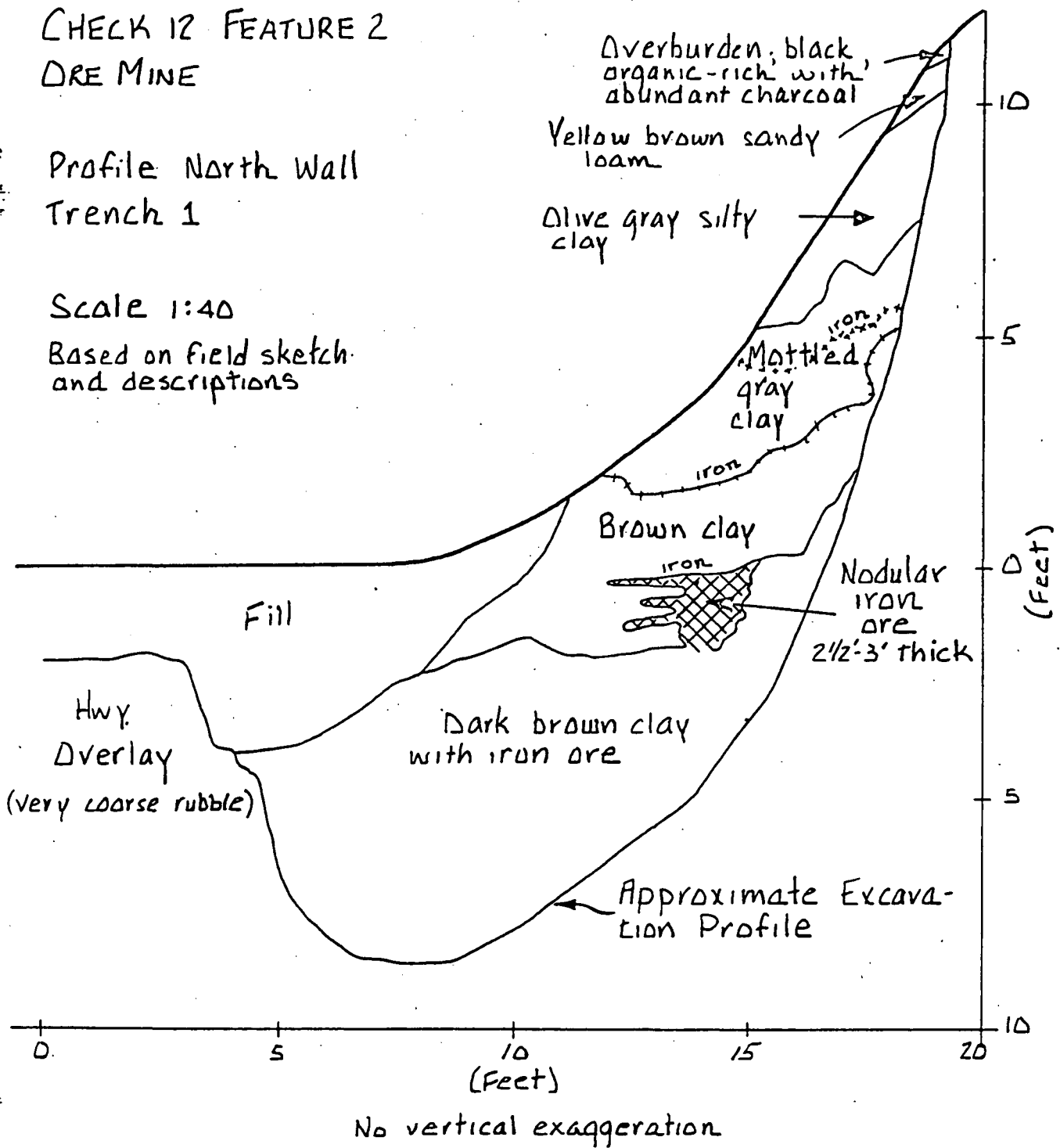


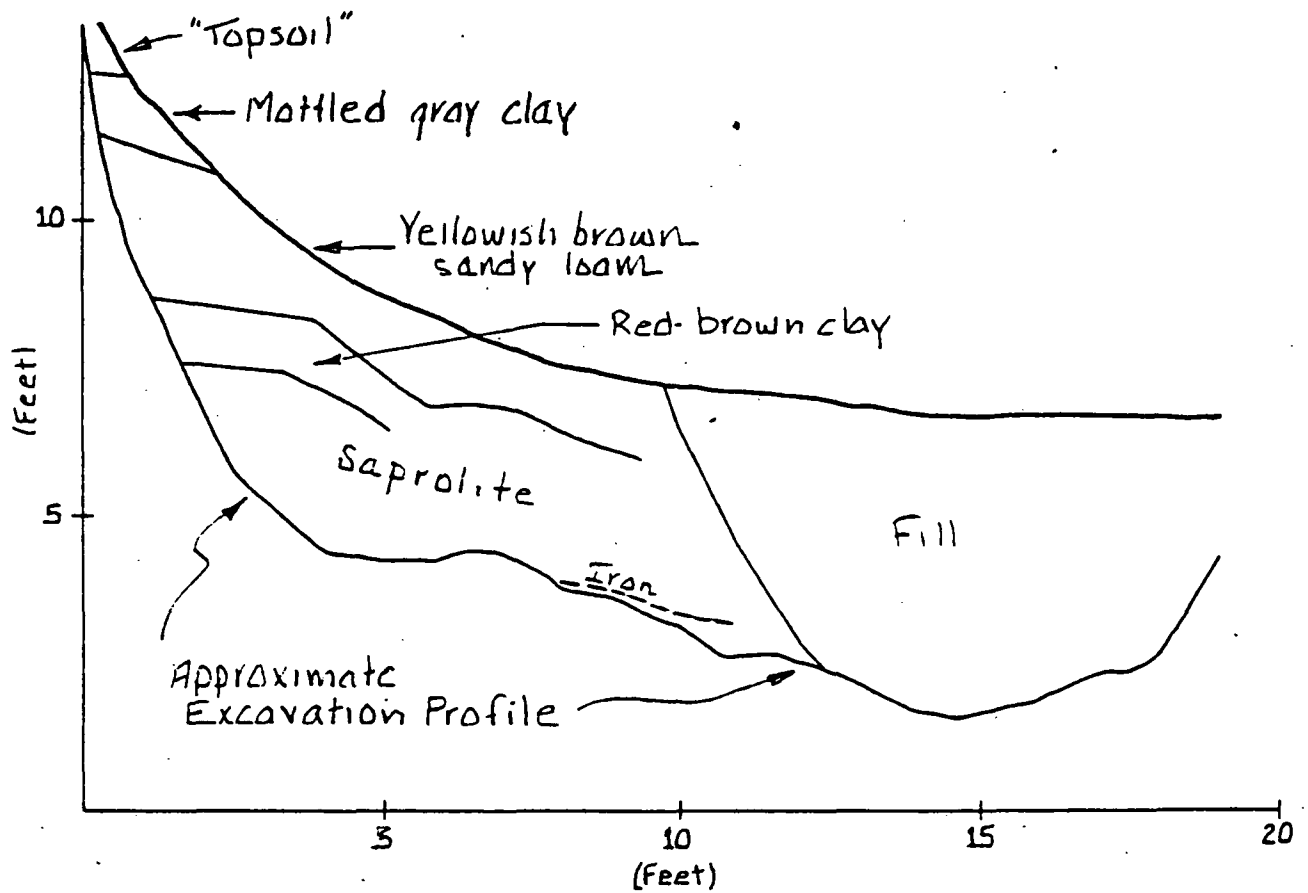
Figure 8

CHECK 12 FEATURE 2  
ORE MINE

Profile North Wall  
Trench 2

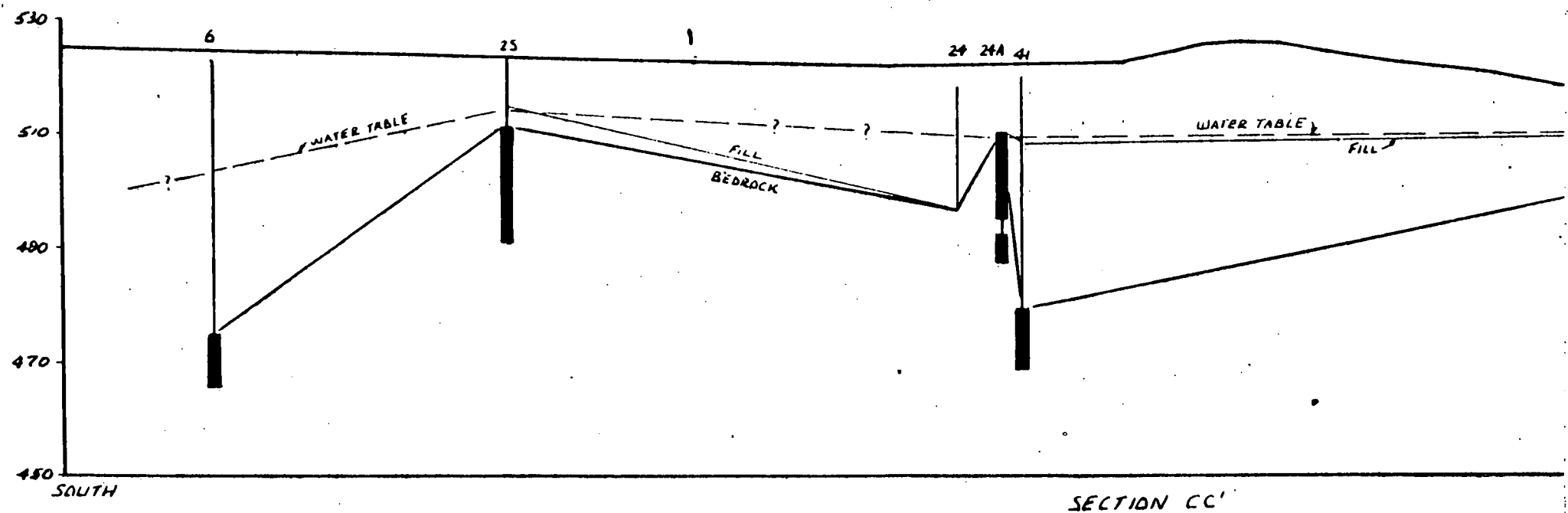
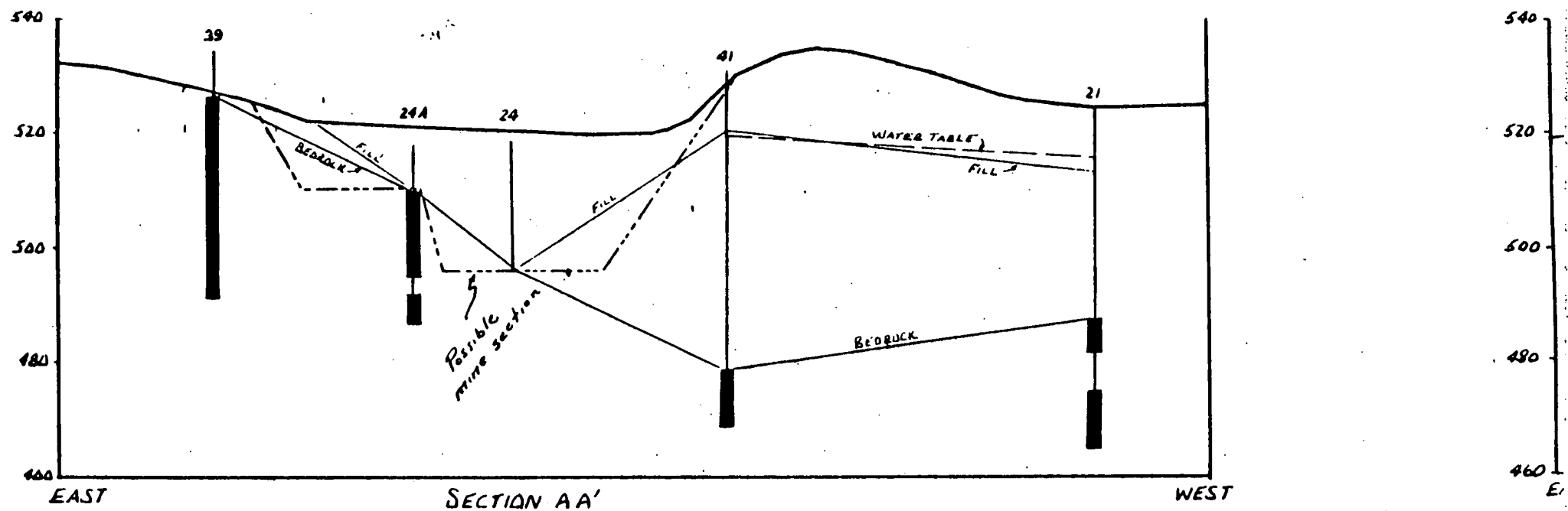
Scale 1:40

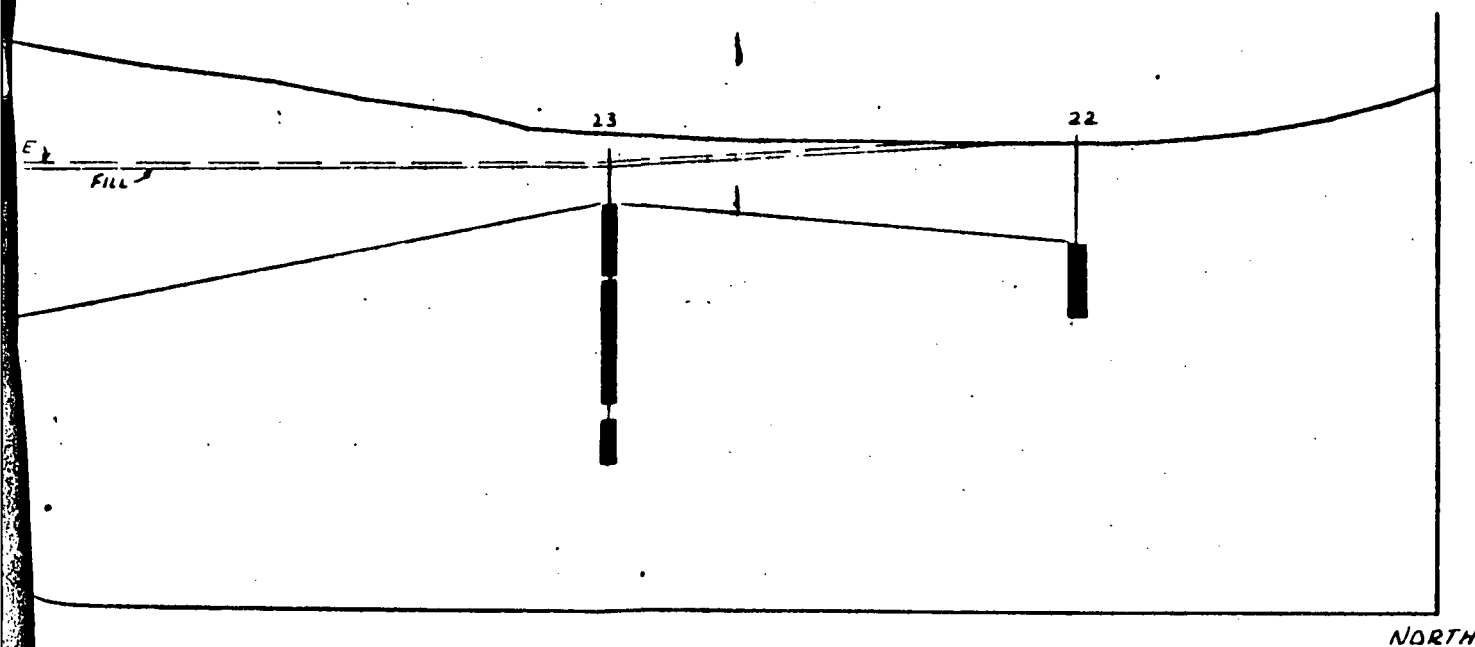
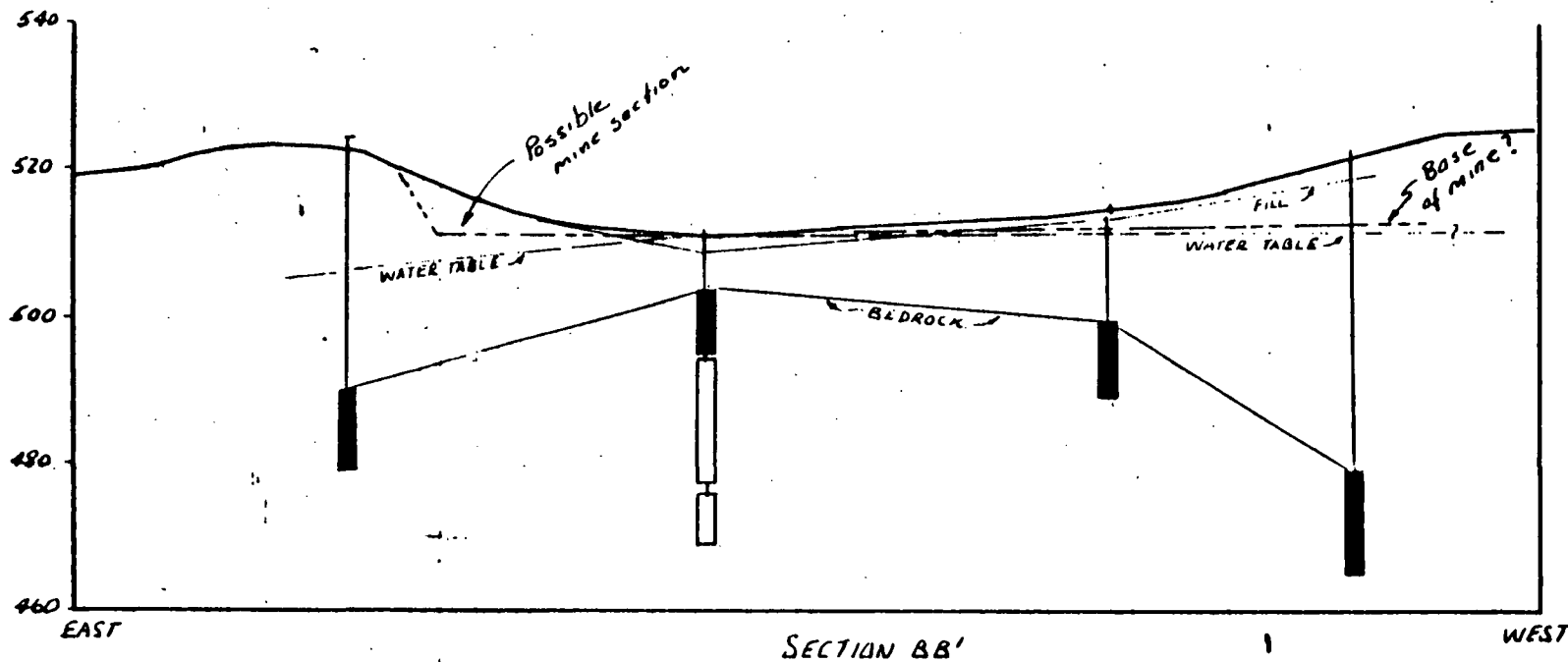
Based on field sketch  
and descriptions



No vertical exaggeration

Figure 9



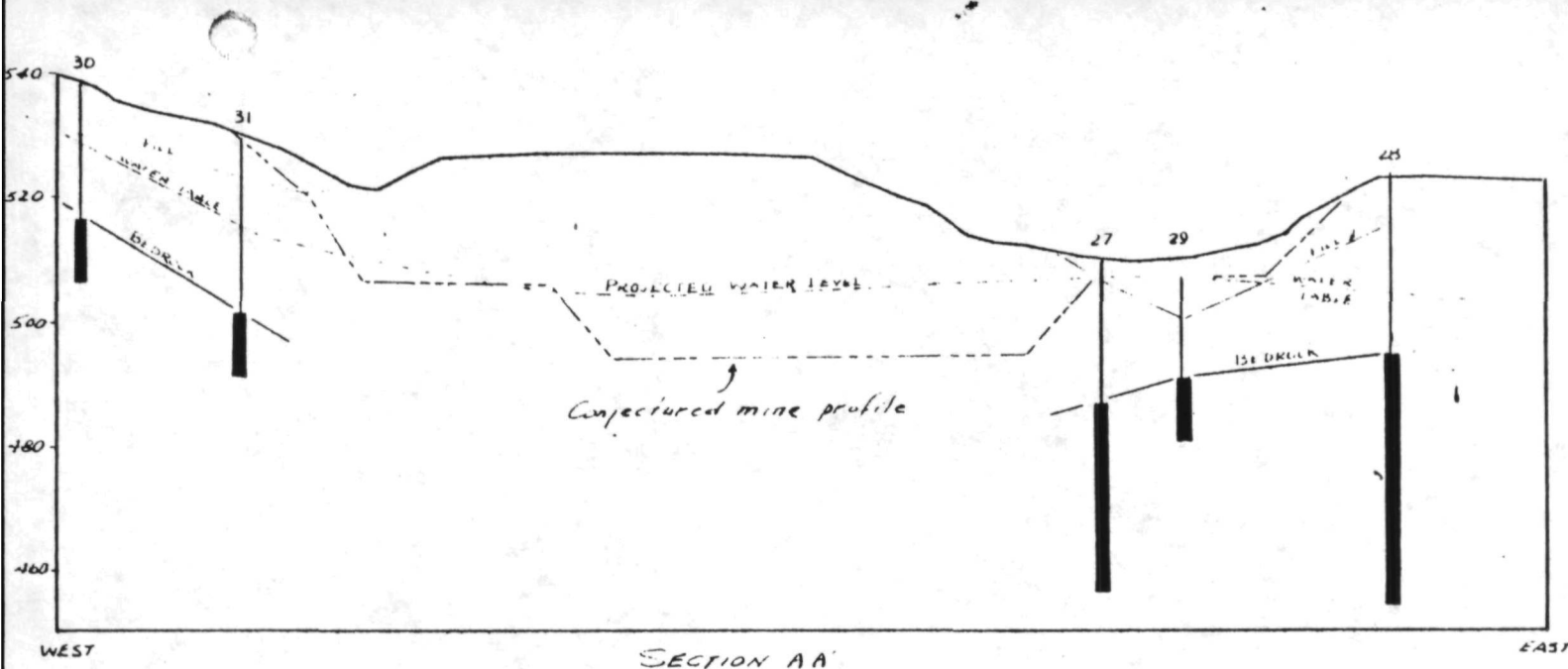


INTERPRETIVE SECTIONS  
CHECK 12 FEATURE 2

FIGURE 10

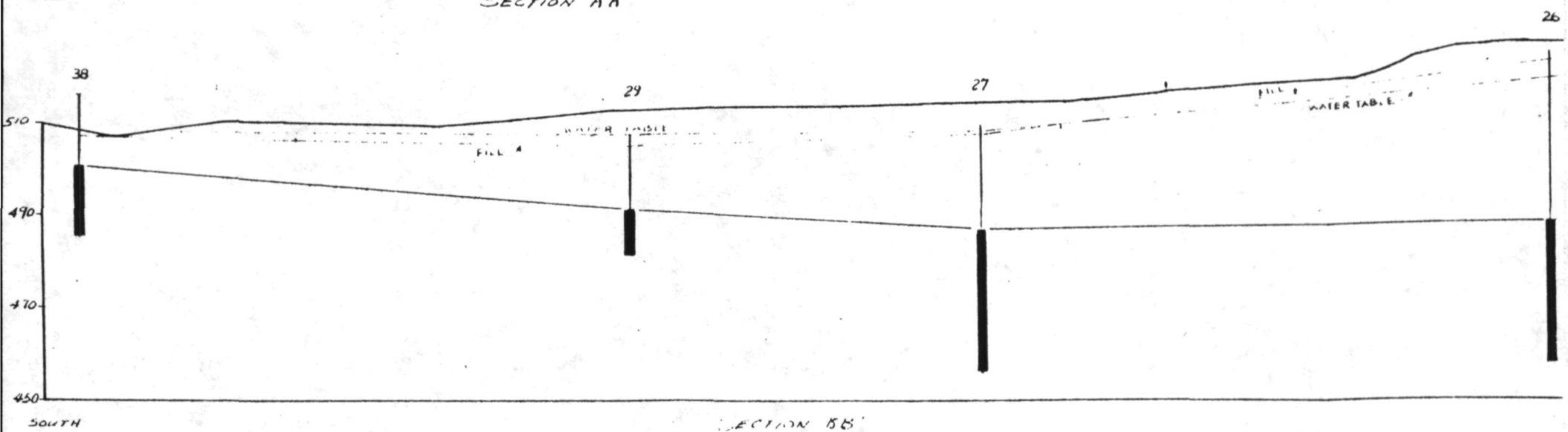
SCALE: 1:240

No vertical exaggeration



INTERPRETIVE SECTIONS  
CHECK 12 FEATURE 4

FIGURE 11  
SCALE: 1 240  
No vertical exaggeration



Feature 4: Deep Ore Mine - The construction of the present alignment of U. S. 15 almost completely destroyed the original form of this feature which Singewald (1911, p. 99) described as an opening located "...back of the furnace..." about 300 feet by 125 feet in size, and striking N20E. To supplement the information on the ore mine that Singewald (1911) provided, a brief surface reconnaissance of the site was undertaken which revealed:

(1) Nodular and irregular masses of iron ore of various sizes occur on the east slope of Catoclin Mountain at levels 20-40 feet or more above the existing roadbed.

(2) Two sections of iron rail, about 6-8 in length, partially imbedded in the "fill" now covering the bottom of the depression near Boring 27 (Maps, Inc., 1978, as revised 1/80).

(3) A small exposure of Harpers formation (gray phyllite) in the drainage channel which exits from the mine at its south end.

To establish the stratigraphy of the ore mine and its immediate surroundings, seven continuous-sample borings were taken. The basic characteristics of the bedrock and overburden are summarized in Plate 4. In general, the bedrock in and about the mined area consists of quartzite and phyllite. The overlying mantle includes one or more iron-bearing horizons, and at the top of the section, abundant charcoal and slag fragments. Based on the subsurface data, interpretive cross-sections have been constructed (Figure 11).

Feature 5: Raceway - There exists a portion of the raceway complex immediately adjacent to the east side of existing U. S. 15 and the north end of the depression marking Feature 2 (Shallow Ore Mine) of this check. A transverse profile through the race channel

and its embankments appeared to reveal the original base of the channel at an elevation of 510-512 feet. In addition, the trench also exposed 30-34 inches of very fine grained sand atop the embankment to the south, and to a much lesser depth on the north side. This sand was observed to have a fine stratification that sloped at a low angle down the embankment toward the channel. Examination under the binocular microscope showed that very fine charcoal fragments are very abundant constituents of this material.

Feature 6: Charcoal Road - This road is reported to be the route by which charcoal from the mountains was delivered to the blast furnaces during the Middle Period of iron-making at Catoclin (Orr, 1979, p. 34). Based on the evaluation of an earlier series of borings and auger holes, it was conjectured that the site of the charcoal road may overlies a complete geologic section of ore-bearing strata owing to its location between known iron mines to the north and south (Greene, 1977). After examining the appropriate borings and driller's logs, Fauth (1978, pp. 4-6) suggested an alternative interpretation - that the charcoal road was located in a position known to be without ore-bearing strata. In an attempt to secure additional information on the possible relationship(s) between the charcoal road and the adjacent mined areas, Boring 26 (Plate 4) was located just beyond the present terminus of the charcoal road on the south side of U. S. 15. The boring, which penetrated bedrock at a depth of 36 feet, extended to a total depth of 66.5 feet. Only two iron-rich intervals were encountered; one, 0.8 feet thick at a depth of 29.5 feet, and the other, 0.3 feet thick at a depth of 32.0 feet.

### Evaluation

Feature 1: Shallow Ore Mine (West) - The topography and subsurface strata at this site demonstrate that this feature is an iron ore mine; probably a westward-driven extension from the larger ore pit located east of existing U. S. 15 and labelled Check 12, Feature 2. Considering the relative placement of the two ore mines and the surrounding topography, it appears that a connection between them probably existed at one time in the vicinity of Boring 20 (opposite station 576+50; Maps, Inc., 1978, revised).

In the narrow "entrance way" to Feature 1 ore mine, backhoe trenches 2 and 3 incised definite ore-bearing strata on opposing banks. These strata and the subjacent banded clay are truncated on both sides of the corridor by a distinct, steeply inclined surface (Figure 5 and 6). On the north side, the truncating surface persists with nearly uniform dip until the horizontal base of the corridor is reached at a depth of almost 10 feet below present land surface. On the opposite bank, "timbers" uncovered during the course of backhoe excavation suggest that the south wall of passageway probably assumed a near-vertical attitude in its lower portions. These relations are sketched in Figure 12.

Above the banded clay and partially overlapping the ore-bearing intervals are a series of "fills". Under the binocular microscope no trace of charcoal, glassy slag, or other evidence is present to indicate that these materials were derived from an off-site source. In fact, some of the constituents of the fill, notably the olive gray clay (Figure 5), was observed to occur in other trenches within this site and in adjoining areas.

Sketch showing probable mine profile at entrance to Feature 1 ore mine; illustrates relationship between entry level and ore zone.

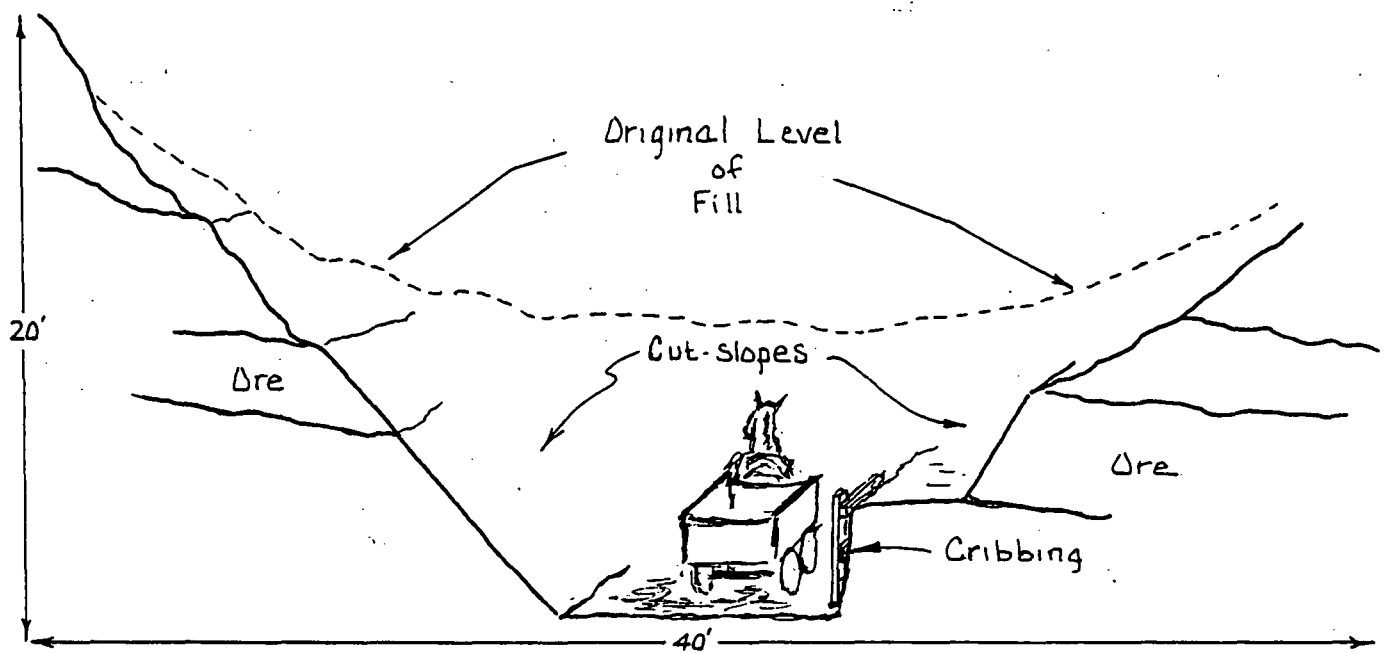


Figure 12

Considering the level of the ore zones in the existing banks and its low slope, an excavation to the depth documented to exist at this site was not needed to expose the ore-bearing strata. Then what was the purpose of the excavation, and why was it subsequently filled by material of apparent on-site origin? One interpretation; consistent with Colonial and early, post-Colonial period iron ore mining practices, and evidence present at this site, follows:

In order to facilitate the loading of iron ore into ore carts, they are run into the mine at a level below the ore-bearing strata where shoveling or prying will loosen the ore and cause it to fall

into the waiting cart. As the mining progressed farther into the hillside (west at Check 12, Feature 1), the overburden stripped to expose the iron ore was used to regrade the earlier mined portions of the ore mine to provide adequate drainage of surface and ground water, and/or provide a uniform, gentle grade on which to move the heavy, ore-laden carts.

Feature 2: Shallow Ore Mine (East) - Bedrock at this site consists of two different rock types. The quartzites and phyllites are part of the Harpers formation, and they comprise the entire rock section penetrated by borings situated in the western portion of the area, or occur below carbonate rocks in some of the other borings. These carbonate rocks, almost exclusively dolomite, occur in the lower part of the Frederick formation. In borings taken from the eastern section of the area, they make up the entire bedrock sequence sampled (Plate 3).

Interpretive sections through this ore mine are presented in Figure 10. Data from borings located off the section line were projected into the profile by lines approximately parallel to the apparent trend of the feature in constructing the transverse sections rather than by orthogonals. This procedure was also used in compiling the interpretive sections for Feature 4. These diagrams attempt to integrate several types or sources of data; including: (1) subsurface data from borings, trenches, and impact profiles (Orr and Orr, 1977), (2) the geologic setting of the area, and (3) the probable mining methods and constraints of the early and middle Catocin periods:

Using data on ground water levels obtained from the boring program, the approximate water table for the ore pit is identified. This ground water level is considered representative of past conditions for several reasons:

(1) The marked and sudden decline of the water table at the south end of the pit (Figure 10, Section C) is consistent with the fact that the furnace site, 300 feet to the southeast, is at an elevation of 490 feet, yet must have been situated above the water table throughout the iron-making history of Catoctin Furnace.

(2) The water table rises toward the north end of the depression as it more closely approaches a surface stream, Little Hunting Creek.

(3) Ground water at the north end of this ore mine lies slightly below the base of the ore pit on the opposite side of U.S. 15 (Feature 1); a relationship necessary to maintain proper drainage and mining operations at both sites.

(4) A lower water table in the past would have placed the pyrite ( $\text{FeS}_2$ ) present in the bedrock and mantle of the immediate subsurface in a chemical environment characterized by oxidation, thus causing the mineral to alter or partial decompose. There is no evidence of the alteration of pyrite in the core samples examined from this pit.

Cross-section C (Figure 10) is a longitudinal profile through the ore bank. The position of the water table and the base of the fill, nearly identical in all borings, is interpreted as defining the base of the ore mine. At this site, mining was not conducted much more than 30 feet below the highest surface elevation on the existing perimeter of the pit. In regard to depth and relationship

to water table, this feature is similar to 18th century ore pits which Thompson reports (1976, p. 6) were seldom more than 50 feet deep and rarely extended below the water table.

Based upon the thickness of fill and the depth of the water table, the ore mine appears to be divisible into two sections; a deep, forward (south) section, and a shallower rear section. There is some evidence to suspect that ore was "hailed" from the more northerly portions of the mine along a grade maintained near the east bank of the excavation. This interpretation stems from the existence of the unusually deep fill in Boring 24 which brings that site even with the level of bedrock in Boring 24A and into "grade" with the floor of the mine at adjacent boring sites near the east side of the pit. This configuration of the mine is portrayed in transverse section A (Figure 10). Inspection of boring profiles presented in Plate 3 shows that a number of ore-bearing zones remain below the level of past mining in the northern sector of the pit, and exist in the banks along the east and west margins of the depression. The thickest and "richest" concentration of ore seems to occur in the vicinity of Borings 25 and 39, and was probably incised by Trench 1 (see Figure 8).

Feature 4: Deep Ore Mine - Singewald (1911, p. 199) reports on the dimensions and orientation of the ore pit. Using those data, the impact profiles (Orr and Orr, 1979, p. 59), and the boring profiles, two interpretive cross-sections were constructed in an attempt to portray the approximate form of the original working, and to assess the potential ore resources remaining at this site.

Because the present highway is located over much of the mined area, boring sites were restricted to the eastern and southwestern portions of the feature. This factor limited the placement of a transverse profile across the ore mine (Figure 11, Section A), and increased the speculative character of the cross-section. In the case of Section B (Figure 11), four borings spaced at subsequent distances along the profile line exercised a greater amount of control on the construction and form of the cross-section.

What deductions and interpretations are warranted based upon the available data base for this feature?

(1) If Singewald's description of the depth of the ore mine is reasonably correct (1911, p. 119), then projection of ground water levels measured in the borings located near the ends of Section A (Figure 11) across the ore pit indicate that portions of mine extended below the water table. If such a condition existed, mining would have been practical only because of the availability of steam pumps to discharge the ground water. Use of pumps to extend mining below the water table is typically associated with the latter half of the nineteenth century.

The possible impact of the present highway alignment on present water levels has been evaluated. If the fill on which U.S. 15 is situated acts as a barrier to ground water flow, it would tend to increase the height of the water table west of the roadway and reduce it to the east. On the other hand, if potential infiltration is reduced by the capture and diversion of surface drainage and shallow ground water by the highway surface and the

concrete "flume" to the west, one would expect a general lowering of the water table. In either case, the probable effect of the present highway location on current ground water level in the mined area is likely a lowering of the water table below previous levels. Thus, the interpretation that some mining at this site occurred below prevailing ground water levels is not invalidated, at least in respect to this factor.

(2) The longitudinal section (Figure 11, B), located near the eastern margin of the mined area shows a thin veneer of fill covering an appreciable thickness of residuum that contains several iron-rich intervals. These deposits are inferred to lie below the limits of past mining based on the thickness of the fill, and the interpretation of impact profiles. In general, the level selected as the probable bottom of the pit in this section is about 15 feet below the adjacent bank, a depth cited by Singewald (1911, p. 199) for this part of the ore pit.

(3) Two lengths of iron rails were discovered partially buried in fill in the vicinity of Borings 27 and 29. This evidence suggests that the shallow grade shown in Section B (Figure 11) was purposely isolated from mining operations or constructed to facilitate the transport of ore from the mine via an ore cart rail line.

(4) Boring 26 is sited below the present terminus of the Charcoal Road (Feature 6), immediately east of U. S. 15. The subsurface profile at the locality, which extends to a depth of 66.5 feet below land surface, includes only two iron-bearing intervals. These zones, located 29 and 32 feet deep, are about 0.9 and

0.3 feet thick respectively (Plate 4). In contrast, ore-bearing strata are more common and more extensively developed short distances north and south of this location. Was the location of the Charcoal Road chosen to avoid ore-bearing or ore-producing "ground"? If so, what is the age of the Charcoal Road at its present location?

(5) Definite fill occurs in Boring 28 to a minimum depth of 8.3 feet (Plate 4). Continuous samples obtained from the fill demonstrate that glassy slag fragments are an important constituent of the material, at least to a depth of 6.5 feet. This Boring provides an accurate measurement of the thickness of the "slag-fill" plateau at its western margin.

(6) Bedrock in the area of this mine consists of quartzites and phyllites that are part of the Harpers formation.

Feature 5: Raceway - The well-sorted, very fine-grained atop the raceway embankment has the character of molding or casting sand. The abundance of fine charcoal that it contains suggests that its source was a site nearer the furnace(s) than its present location. Other than to increase the height of the raceway embankment, no other explanation can be offered as to why this sand was deposited at this site, seemingly in preference to other materials closer at hand and in greater supply.

Feature 6: Charcoal Road - Consideration of subsurface data pertinent to this feature was given previously (Feature 4 - Deep Ore Mine).

## Check 17 - Raceway (18 FR 331)

### Background

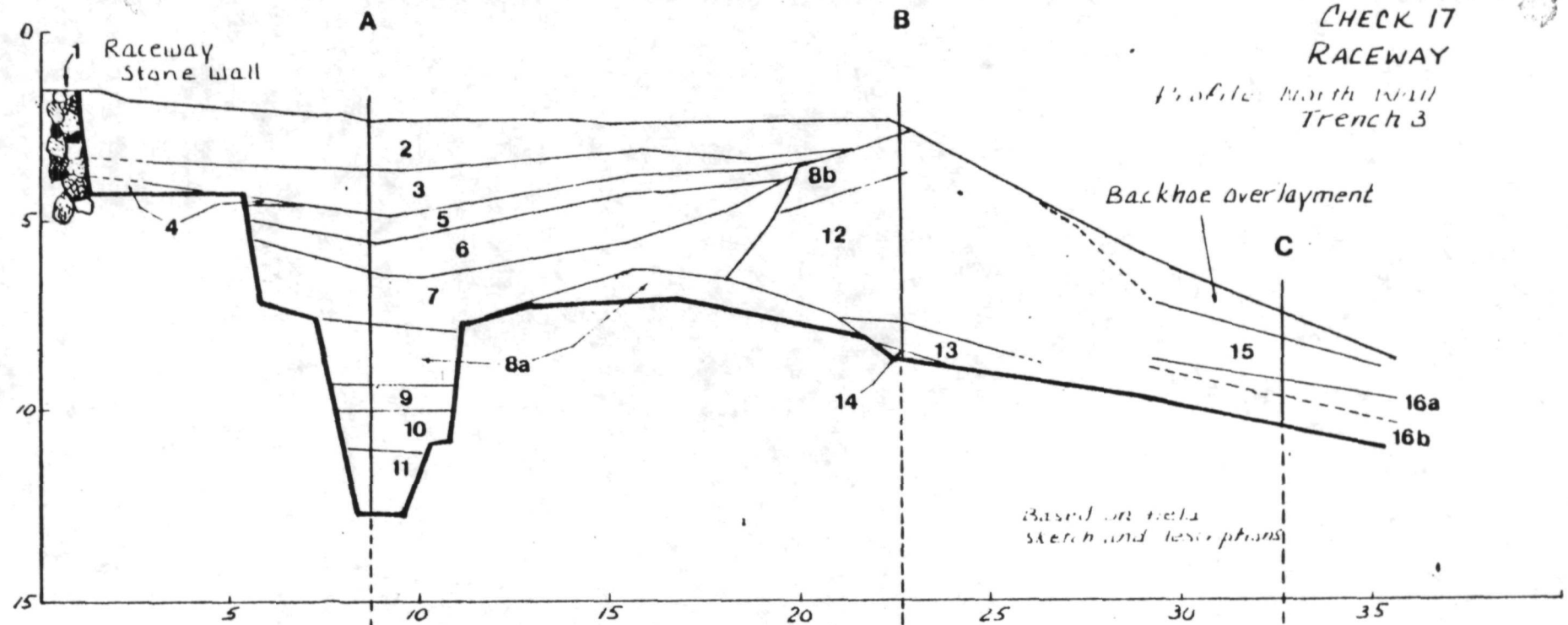
Within the Check 17 area, about 150 feet of raceway is discernable north of the Bathhouse and Spring (Check 4). This feature is an integral part of the raceway system that starts at the Race Pond (Check 11) and ends at the Auburn Dam (Check 3) (Orr, 1979, p. 40).

### Data and Observations

Several trenches were excavated by backhoe to expose a vertical profile through the raceway. One trench located approximately east of station 546 was expanded and modified by shovel and shaving trowel to the form and internal structure shown in Figure 13. This diagram compiled from a field sketch and related field measurement, illustrates the complexity of raceway profile, and the numerous strata that comprise and fill it.

The raceway at this location appears to be buttressed on the west by a stone wall which rests on residuum. On the east, only the arcuate surface truncating units 8a and 12 (Figure 13) resembles a channel form. However, this curved surface lies above and is terminated by another stratum (8a), suggesting that two or more channels may be superposed or entwined.

Samples collected from all portions and strata exposed in this trench profile were examined under the binocular microscope in an attempt to determine the source of the material. The basic characteristics of strata are compiled in Columns A, B, and C (Figure 13). Fragments of charcoal and glassy slag are common in even the lowest units of the profile (e.g.; Units 9, 10, and 11), indicating that



Scale 1:40  
No vertical exaggeration

TOP SOIL	2
A	3
M	5
A	6
H	7
L	8a
P	9
L	10
M	11
A	
O	

x2	E	P
----	---	---

TOP SOIL	2
B	8b
E	12
G	
B	13
	14

I	15
P	16a
G	
B	16b
C	

For explanation of symbols  
see Figure 1

Fig. 13

most, if not all, of the strata comprising and occupying the channel(s) were obtained from an off-site source some time after the beginning of the iron furnace industry at Catoctin.

Similarity of strata at this site with the initial sediment deposited on the substrate at the Auburn Dam (Check 3) suggests that the in-filling of the Auburn Pond also began after one or more blast furnaces at Catoctin had begun to operate. These observations raise some question as to when the raceway at this site originated and the time at which the Auburn Dam began to impound the water channelled through this race system.

## GEOLOGY OF THE CATOCTIN IRON ORE DEPOSITS

### Introduction

Deposits of iron ore similar to that mined at and about Catoctin Furnace occur along both eastern and western margins of the Blue Ridge in Pennsylvania (Frazer, 1877), Maryland (Singewald, 1911) and adjacent states. Seemingly, the deposits are preferentially developed wherever the sandstones and phyllites of the adjacent mountains are in contact with limestones in the adjoining valley areas. On this basis, these iron ore deposits are termed limestone contact deposits by Singewald (1911, p. 190).

In contrast with the western border of the Blue Ridge geologic province where limestone and sandstone formations are almost continuously in contact at the eastern margin, the rocks of Catoctin Mountain abut carbonate rocks only locally. Thus "limestone contact" iron deposits are common and extensively developed along the western edge of the Blue Ridge; whereas, they have a more restricted development and distribution adjacent to Catoctin Mountain. In fact, the only significant iron ore deposit of this type identified to date along the eastern margin of the Blue Ridge in Maryland has been "the large and important occurrences on what is known as the Catoctin property" (Singewald, 1911, p. 193).

Although most of the ore from these iron deposits was exploited during the nineteenth century, the Catoctin Furnace complex is rather unique in that ore production began in the late 1700's and extended into the early 1900's.

### Bedrock Geology

The classic report on the Iron Ores of Maryland by Singewald (1911) described the geologic relationships along Catoctin Mountain near Catoctin Furnace based on the best information available at that time (Keith, 1894). Consequently he described the bedrock geology associated with the Catoctin iron deposits in terms of an overthrust fault which juxtaposed the Loudoun formation and the Shenandoah (Frederick) limestone. Singewald reported that the ore body occurs in the zone of the fault plane (1911, p. 198).

At a later date, Anna J. and George W. Stose studied and mapped the bedrock geology of Frederick County, and recognized that what had earlier been reported as the Loudoun formation was, instead, the Harpers formation (1946). Although Stose and Stose corrected a major error in stratigraphy and eliminated the principal justification for placing a fault between the rocks of Catoctin Mountain and the carbonates of the adjacent valley, they reiterated Singewald's description of ore deposits and the relationship these deposits had to a major fault along the foot of Catoctin Mountain (1946, pp. 151-152).

In 1955, Whitaker and more recently Fauth (1977a) established on the basis of detailed bedrock geologic mapping that a fault between the Harpers and Frederick formation was unsupported by evidence in the area of the Catoctin Furnace site.

Examination of the bedrock cores from the area of Check 12, Feature 2, which contain portions of both the Harpers formation and the Frederick formation, provides no evidence to support a

fault contact between these two rock units. The Catoctin iron ore is not, therefore, a fault contact mineral deposit. Localization of these deposits along the Harpers-Frederick contact is considered by most geologists to reflect geomorphic and geochemical processes that characterize the Blue Ridge (and Catoctin Mountain) wherever quartz-rich rock abut carbonates (Hack, 1965).

#### Origin and Nature of the Iron Ore

The early investigators of the geology of the region had the opportunity to examine newly exposed sections in the extensive and active open cuts and drifts, or those only recently abandoned. In them they could examine the nature of the ore and its relationship to the bedrock and overlying mantle (Frazer, 1877; Singewald, 1911). At present, these openings primarily exist as water-filled holes with slumped clay banks, or as debris-laden dumping sites. In addition, a dense cover of underbrush effectively camouflages other possible openings and prospects. Consequently, little new data has been acquired on which to base a more detailed description and understanding of these iron deposits and their possible origin. Our understanding of the ore and its geology has been, therefore, almost wholly derived from the reports and studies presented in the early literature (Frazer, 1877; d'Invilliers, 1887; Stose, 1909, 1929, 1932; Singewald, 1911).

During the course of this project, numerous excavations of various types plus a series of continuous sample borings were placed

within sections of the Catoctin Furnace complex. The borings, all of which probed twenty or more feet into the subsurface, provide samples of the bedrock and overlying mantle not available since the close of active mining and iron-making activities on this site. From this data bank much information has been obtained (and much can yet be analyzed) with regard to the geology of these ore deposits, mining methods and operations, and the progressive evolution of iron production at Catoctin Furnace.

The ore deposits in the vicinity of Catoctin Furnace, Maryland are similar to those elsewhere along the margins of the Blue Ridge. The ore is basically brown iron ore (limonite and other hydrous oxides of iron) that occurs as nodules, seams, or irregular masses that range from fine grains to bodies weighing several tens of pounds or more. In general, the ore has a rough or pitted surface although smooth-surfaced masses are not uncommon. Internally the iron masses may be solid or cavernous.

The main ore bodies or zones seem to occur where the alluvial-colluvial deposits and the residual clay mantle the foot of the mountain slopes and effectively cover the contact between the quartz-rich rocks of the mountains and the carbonate rocks of the adjacent valley areas. The larger masses of ore occur mostly in plastic yellow clay, but smaller granules and nodules are dispersed throughout yellowish to purplish red clay, or are mixed with quartz grains, fragments of quartzite and phyllite, or subrounded quartzite boulders (Singewald, 1911; Stose, 1929).

Based upon the available evidence, it is generally accepted that: (1) the iron ore deposits are secondary deposits formed in the residual clay and overlying surficial material of alluvial and colluvial origin, and (2) the iron was segregated from the nearby sedimentary and metasedimentary rocks, or was concentrated "in situ" by the weathering of the carbonate rock themselves.

Stose (1929, p. 17-18) summarized the two most commonly held views on the origin of the iron ore as follows: (1) some investigators assign the source of the iron ore to the carbonate rocks, which upon weathering and decomposing, yield a residual deposit dominated by clay and iron oxides; (2) others suggest that surface waters dissolved the iron from the adjacent sandstones and phyllites, some of which are heavily impregnated with iron-bearing minerals, and transported the iron in solution downslope until the surface water began to percolate through the porous debris at the foot of the steep mountain slopes where, due to a change in water chemistry or chemical environment, the iron was precipitated as hydrated iron oxides.

As a result of a more recent investigation, Hack (1965) proposed a theory or model for the origin of the iron and manganese deposits that occur at the base of the western foothills of the Blue Ridge in West Virginia and Virginia in a geologic and physiographic setting similar to those at the Catoctin Furnace site. The following is largely extracted from Hack's excellent paper but it does include some modification so as to maintain consistency in that narrative and the stratigraphy of the Catoctin Furnace area and other known aspects of the local geomorphology, hydrogeology, and regional geology.

The question of origin of these deposits may be considered as two problems: (1) The original source of the iron, and (2) The processes that have concentrated or preserved it in deposits of minable grade. Two ideas have been held in the recent past. Most geologists believe that the iron is syngenetic and that below the zone of weathering it occurs in the basal beds of the Frederick formation in the form of iron carbonate disseminated through the rock in very low concentrations. Other geologists have thought that the iron, although syngenetic, was either in beds either stratigraphically above or below the present position of the deposits.

Hack points out (1965, p. 70) that the iron deposits occur in residuum on carbonate rocks; usually the basal beds of the first carbonate rock unit encountered at the foot of the Blue Ridge province. In the case of this study area, the ore does occur in residuum overlying quartzites and phyllites. However detailed knowledge of the stratigraphic sequence at Catoctin Furnace makes it impossible to determine whether or not the beds are at the very top of the Harpers formation. In general, it seems justifiable to say that the base of the Frederick formation is probably the principal control on the localization and distribution of the iron deposits. According to Hack (1965, pp. 70-76):

The essential element in his theory on the origin of iron and manganese deposits at the foot of the Blue Ridge is that the physiographic setting constitutes a mechanical and chemical trap from which the supergene oxides of manganese and iron do not escape immediately, but are preserved while other constituents of the rock are carried away. The mechanical trap is provided by the gravel cover over the residuum in the colluvial-alluvial aprons; the chemical trap is provided by the reactions that take place as the carbonate rock is dissolved and the acidity (pH) of ground water and surface water rises.

The geochemistry of iron at low temperatures is fairly well understood (Hack, 1965, p. 70; also Figure 14). Based on this factor,

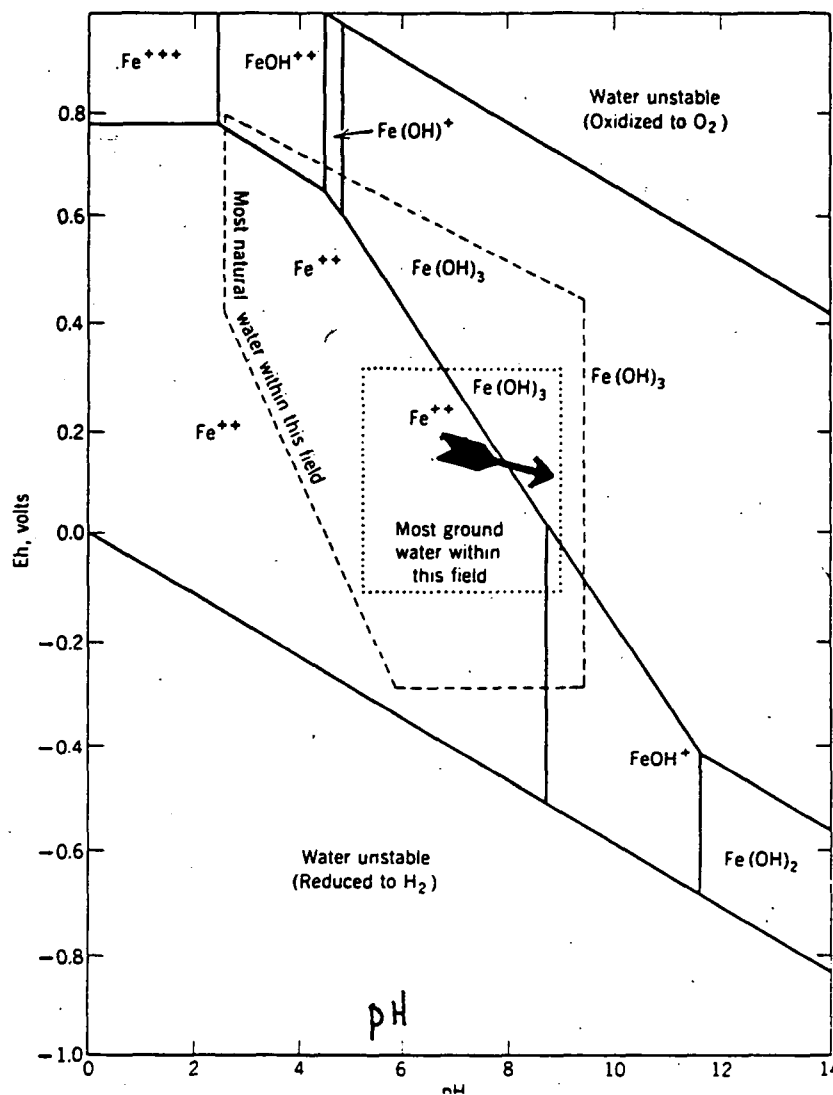


Figure 14

Stability fields for the aqueous ferricferrous system and the Eh-pH characteristics of natural waters. (From Davis and DeWiest, 1970)

and the observed geologic relationships existent at Catoctin Furnace, the following scenario (mainly adapted from Hack, 1965) can be constructed.

Water enters the outcrop area of the Frederick formation either as rainwater or as runoff in the streams drawing adjacent Catoctin Mountain or areas to the immediate west. Both rainwater and surface

waters that drain the Loudoun, Weverton, and Harpers formations, predominately quartz-rich rocks, will be acidic (pH 7.0). These waters dissolve the calcium and magnesium carbonate of the Frederick formation, and ultimately discharge them through percolation and/or surface flow.

As the waters react with the carbonate rocks, the pH is increased. Under the prevailed Eh conditions (slightly oxidizing), increased pH causes precipitation of the iron oxides or hydroxides (Figure 14) and they remain in the residuum with other insoluble impurities (e.g., clay, quartz) although some local transport may occur. Basically, water whose pH has been raised to 7 or greater and whose Eh (oxidation potential) has been lowered slightly because of reaction with carbonate rocks or with constituents of the residuum is unable to effectively transport iron in solution (p. 72).

Although water chemistry data are meager for the Catoctin Furnace area, Godfrey (1975, p. 25) reports pH readings of about 6.0 for Fishing Creek near Lewistown, Maryland, a few miles south of the furnace site. In discussing ground water quality and characteristics, Meyer (1958; pp. 49-51, 73-74) states that the pH of ground water in the Weverton and Harpers formations are low (pH about 6.0), and comments about the corrosive nature of the water. In contrast, published data on ground water chemistry for the Frederick formation indicates a range in pH between 7.0 - 8.0 with measurements of 7.7 and 7.8 most common (Meyer, 1958, p. 82). The data, consistent with those obtained elsewhere under similar geologic and climatic conditions, are sufficient to endorse Hack's concept regarding the origin of the iron ore deposits at Catoctin Furnace. Although this explanation does not necessarily identify the source of the iron, the prominence of pyrite ( $\text{FeS}_2$ ) in both the carbonate and non-carbonate rocks obtained in the borings taken at the Catoctin Furnace site certainly identifies portions of the upper Harpers and lower Frederick formations as potential source beds.

## SUMMARY AND CONCLUSIONS

The Catoctin Furnace Archaeological Mitigation Project has focussed the energy, interests, and professional expertise of a number of investigators on the physical and cultural history of the iron industry at Catoctin Furnace. This report primarily treats the geologic and environmental factors that bear on the origin, development, and finally, the cessation of iron production at this Maryland locality. The report addresses a number of issues and questions. It provides answers to some questions and others remain unanswered. More importantly, perhaps, the report adds substantially to the data base on the Catoctin Furnace complex and it challenges some of the conclusions formulated earlier.

At the Auburn Dam and Pond (Check 3), new data provided by a series of continuous-sample borings clearly define the original base of the pond. Sediment that has accumulated in the pond characteristically contains fragments of charcoal and glassy slag. These particles suggest that the enclosing sediment originated off-site, and some time following the establishment and operation of blast furnaces at Catoctin.

The rock exposed at the Limestone Quarry (Check 9) is a calcium-magnesium carbonate - a dolomite. This aspect of the rock, itself, does not preclude its use as a flux in blast furnaces. However, the percentage and nature of the insoluble residue reported in this rock, and the limited size of the quarry(?) establish that this site did not produce significant flux for the Catoctin furnaces.

The character of the landscape surrounding the Race Pond (Check 11), as depicted by the project's topographic base map, is probably sufficient justification to suggest that the site was originally an ore pit. When subsurface data indicate that the base of the pond lies much below its principal outlet, the proposition that the race pond site originally served some other purpose is reinforced. If it did, then some important questions must be raised relative to the age of the raceway complex, its role in providing water power to the furnaces, and the source of water power to the furnace complex prior to the conversion of this site to a race pond.

As a result of this project, much new data are available to identify and describe the nature and significance of several depressions located astride U. S. 15 north of Catoctin Hollow Road. Without doubt, available evidence substantiates the existence of ore banks at the sites of Feature 1, 2, and 4 of Check 12. Although the identity of Feature 4 is of some considerable historic record, the ore banks at Feature 1 and 2 were only more recently recognized (Orr and Orr, 1977). Additional evidence from this study supports the proposition that these ore banks were shallow mines developed above the general water table level, and that they supplied the Catoctin furnace(s) at an early stage in the iron-making history of this furnace complex.

In addition, this investigation has established that iron-rich strata still remain in many sections of Check 12. Although the

implementation of the Alignment 1 construction corridor may impact on some of these sites, others of equal quality and accessibility will remain essentially unaffected and secure for future examination.

The character of the strata which appear to define and fill the raceway channel(s) at Check 17 suggests that iron furnaces "in blast" preceded the construction and use of this section of the raceway complex. Taken in conjunction with nature of the sediment first deposited in the Auburn Pond, it seems that this segment of the raceway complex was established some time following the on-set of furnace operations at Catoctin.

A Colonial iron industry was established at Catoctin Furnace in the late eighteenth century because this site possessed the four necessary attributes; iron ore, timber for charcoal, limestone for flux, and water power. It developed and expanded with time, only to decline and expire in the late nineteenth and early twentieth centuries when advances in technology and improvements in transportation joined with the discovery of new mineral resources and the new "industrial" economics.

Even with completion of the planned dualization of U. S. Route 15 along the Alignment 1 corridor, this site will still retain in accessible locations the essential components that sponsored the establishment and development of the early iron industry at Catoctin Furnace. Proper management and development of this site can offer Marylanders and others a unique historic and educational experience.

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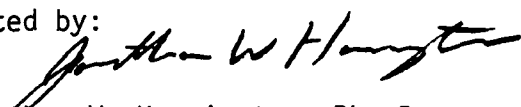
APPENDIX B

A PRELIMINARY PALYNOLOGICAL ANALYSIS  
OF BORINGS AT CATOCTIN FURNACE, MARYLAND

Prepared for:

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115 West Main Street  
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Submitted by:

  
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Date: August 12, 1980

## CONCLUSIONS AND RECOMMENDATIONS

Muck lithologies suitable for recovery of palynomorphs were lacking in the cores from the Auburn Dam site. Of the 19 samples processed from the Race Pond cores, the majority contained very sparse floras. The processing of larger size samples might provide more information. Each channel cut covered a two inch interval of core. These could be divided into two or three separate samples. However, even with these proposed modifications, there would still be too few points to establish a meaningful chronological profile.

An additional problem which has recently come to my attention is the probable presence of fill below most of the pollen samples. Analyses of any material not definitely in situ must be suspect. Further study would have to be keyed to the petrographic descriptions being reported by Dr. Fauth.

Given the available data, there is no evidence that selective cutting of timber was employed. Kaylor (1946) states that this was usually the case in Frederick County. As the more valuable species were removed, the percentage of inferior species would progressively increase. On the other hand, Kaylor (1946) also suggests that the timber in the vicinity of Catoctin Furnace was clear-cut approximately every twenty-five to thirty-five years. The presence of oak and chestnut in most samples seems to confirm this. Clear-cutting would result in sprout forests rather than a clearly developed plant succession. Chestnut and oak are the common trees with greatest sprouting capacity. Presence of chestnut would predate the arrival of the chestnut blight in approximately 1912.

## INTRODUCTION

Initiation - This investigation was undertaken at the request of Dr. Kenneth Orr, Archaeological Consultant. Results are ancilliary to the Catoctin Furnace Archaeological Mitigation Project.

Purpose of Study - The primary objective of this study was to attempt establishment of chronological profiles for Auburn Dam and Race Pond based on dominant trees. It was hoped that this would clarify lumbering practices for charcoal fuel during the period of iron production from 1760 to 1903.

Scope and Conditions of Study - Core samples from 6 borings at Auburn Dam and 9 borings at the Race Pond were made available for study. Muck lithologies suitable for palynological recovery were present only at the Race Pond. Forty hours of laboratory investigation were contracted.

## PROCEDURES

Core samples were examined completely and two-inch channel cuts were obtained from suitable lithologies. Initial physical disaggregation was accomplished by ultrasonic cleaning in acetone, followed by boiling in 10% NaOH to flocculate shale particles.

Following centrifuging and decanting in distilled water, acid maceration was undertaken following the method of Wilson (1949). Samples were digested in 60% HF for 12 hours, centrifuged and stained with safranin yellow.

Strew slides of each sample were examined randomly in each of four runs. Resulting identifications were then compared and combined. In this way, operator error or identification biases were minimized. All samples have been retained for possible future investigation.

## RESULTS

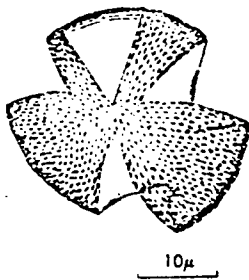
### Sample Descriptions

Boring #	Sample #	Depth (Feet)	Flora
11	3	6-8	sparse, <u>Carya</u>
11	10	20-22	sparse, <u>Fagus</u>
11	15	30-32	very sparse, <u>Pinus</u>
19	4	6-8	barren
12	3	4-6	sparse, <u>Pinus</u> , <u>Acer</u>
12	6	10-12	sparse, <u>Pinus</u> , <u>Castanea</u>
12	13	26-28	no identifiable palynomorphs
18	4	6-8	sparse, <u>Pinus</u> , <u>Quercus</u> , <u>Carya</u>
18	11	20-22	sparse, <u>Pinus</u> , <u>Quercus</u>
17	6	10-12	no identifiable palynomorphs
17	10	18-20	very sparse, ? <u>Quercus</u> , <u>Pinus</u>
13 (Shelby tube)		0-1.5	abundant flora, <u>Pinus</u> , <u>Quercus</u> , <u>Carya</u> , <u>Sphagnum</u> , <u>Lycopodium</u> , <u>Castanea</u> , <u>Fagus</u> , <u>Rumex</u> , <u>Alnus</u>
16	3	4-6	very abundant; <u>Pinus</u> , <u>Quercus</u> , <u>Carya</u> , ? <u>Fagus</u> , <u>Aster</u> , <u>Solidago</u>
16	12	22-24	no identifiable palynomorphs

Sample Descriptions (Continued)

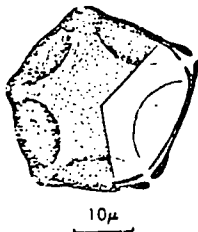
Boring #	Sample #	Depth (feet)	Flora
14	2	2-4	sparse, <u>Pinus</u>
14	5	8-10	no identifiable palynomorphs
14	8	14-16	no identifiable palynomorphs
15	2	2-4	sparse, <u>Pinus</u> , ? <u>Castanea</u>
15	4	6-8	abundant, <u>Pinus</u>

Palynomorph Identifications:



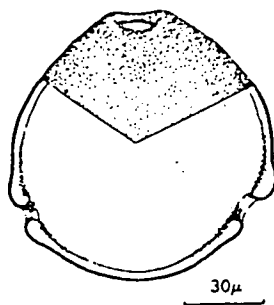
Acer, Maple (? Striped Maple)

Size: Polar and equatorial axes 22-25  $\mu$   
 Range: Quebec to Manitoba south to Michigan, Tennessee, Georgia  
 Shape approximately spherical (P/E Index about 1.0), Columellae arranged in striations, often clustered in patches of various orientations; intectate. Furrows long (Extend to about 3 $\mu$  from poles).



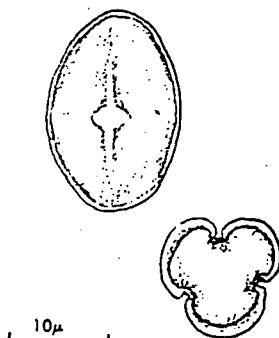
Alnus, Alder

Size: equatorial diameter about 30  $\mu$   
 Range: Northeastern United States and adjacent Canada  
 Five pored pollen, shape angular. P/E Index about 0.7. Pores aspidate, ectexine separates from endexine at pore to form pore cavity.



Carya, Hickory

Size: 40-45  $\mu$ , equatorial diameter.  
 Range: Coastal Plains, Florida to Texas, north to Virginia  
 Pollen slightly heteropolar



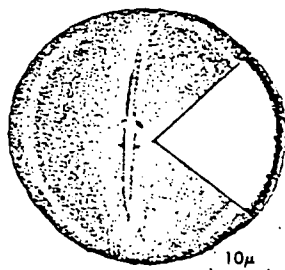
Castanea, Chestnut

Size: Polar axis about  $18\mu$ , equatorial about  $13\mu$ .

Range: Georgia to Mississippi, north to southern Maine.

Shape prolate (P/E Index 1.35 to 1.4). Trilobate in polar view. Furrows narrow and slender, transverse furrows are elliptical with pointed ends.

Fagus, Beech

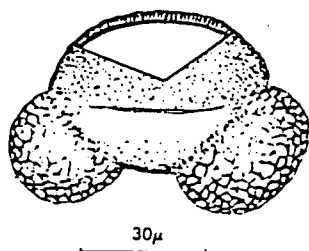


Size: Polar axis about  $46\mu$ , equatorial diameter  $49\mu$ .

Range: Prince Edward Island to eastern Wisconsin southward in Great Lakes region to Virginia.

Shape oblate spherical (P/E Index 0.9). Furrow of intermediate length and very slender, pore round, considerably exceeding the furrow. Exine indistinctly tectate; fine granular appearance apparently due to columellae.

Pinus, Pine

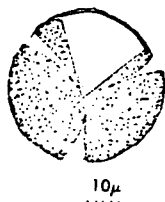


Size: Body width 35 to  $40\mu$ , length 40 to  $48\mu$ , overall  $80\mu$ .

Range: Northeastern U.S. and southern Canada

Size frequency statistics may be of some value in identification of pine pollen if large populations of grains are available and measurements can be made of several dimensions. However, the variation in both bladder morphology and size, and overlapping characteristics, make separation of species difficult.

Quercus (?Q. bicolor). White Swamp Oak?

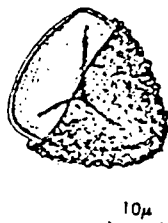


Size: Polar axis about  $40\mu$ . Equatorial diameter  $35\mu$ .

Range: Southern Maine to southern Minnesota south to Nebraska and upland Georgia.

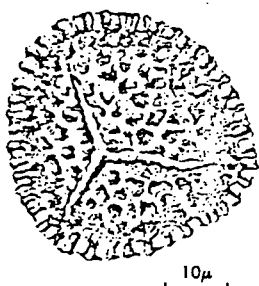
Shape subprolate (P/E Index 1.15) Surface with fine granular structure with larger scattered verrucae, typical of oaks. Furrows constricted at the equator.

Sphagnum sp., Peat Moss



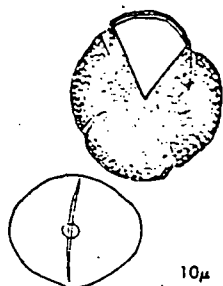
Size: about  $30\mu$ .  
 Range: North Temperate and Boreal areas.  
 Smooth subtriangular spore wall, sometimes with a distinct exosporium and endosporium. Arms of the trilete scar may only extend one-third the distance proximal pole to the equator.

Lycopodium, Club Moss



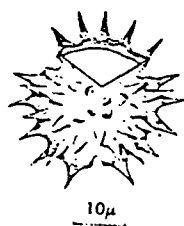
Size:  $40-50\mu$   
 Range: Widespread in U.S., Canada, Eurasia.  
 Reticulum irregular, sometimes nearly rugulate; proximal face smooth.

Rumex, Sheep Sorrel



Size: Polar axis about  $19\mu$ ; equatorial about  $24\mu$ .  
 Range: widespread, almost cosmopolitan.  
 Shape suboblate (P/E Index about 0.8). Apertures three or four, furrows slender, pore round and much exceeding the furrow margins. Exine coarsely reticulate.

Solidago, Goldenrod



Size: Polar axis about  $34\mu$ , equatorial about  $30\mu$ .  
 Range: North Carolina to Louisiana and Oklahoma north to Michigan and Massachusetts.  
 Shape spherical to prolate spherical (P/E Index about 1.1). Furrows of intermediate length, ends rounded, transverse furrows pointed, exine about  $4.5\mu$  thick, including 2.5 to  $3.5\mu$  long spines.

Aster, Aster

Size: greater than  $35\mu$ .  
 Range: Cosmopolitan  
 Protuberances greater than  $1.5\mu$  in height, echinae, no columellae visible underneath tectum.

## INTREPTATION OF DATA

Pollen samples indicate the presence of a typical mixed mesophytic forest, with a beech-maple association in areas of better soils and an oak-hickory association characterizing drier and more exposed sites (Gleason and Cronquist, 1964). The latter association would have replace an oak-chestnut precursor about 1912.

The presence of pine in most samples is probably deceptive, as this may not have been a dominant species in the immediate vicinity of Catoctin Furnace. Pine does occur in the Catoctin Mountains west of Thurmont where it is mixed with hardwoods (Kaylor, 1946). However, it should be noted that pine is a very prolific pollen producer. The pollen grains are highly motile and attain a wide distribution. The presence of this species could be sustained by periodic forest fires.

A bog association of Sphagnum, club moss and alder is present in sediments recovered by Shelby tubes from the center of Race Pond.

In samples 13-1 and 16-3, the occurrence of goldenrod, aster and sheep sorrel suggest the presence of open areas, perhaps subsequent to periods of clear-cutting. Species indicative exclusively of open field environments (such as yarrow), were not identified. Definite pioneer species like raspberry, black cherry or aspen were also absent from the samples processed.

## ACKNOWLEDGMENTS

Extensive discussions with Dr. John Fauth, Geology Department, SUNY Cortland, on geological aspects of the Catoctin Furnace Area have been invaluable

in the preparation of this report. Drs. Larry Klotz and Eugene Waldbauer, of the Biology Department, SUNY Cortland have clarified floristic problems.

Laboratory assistance was provided by Mr. Stuart Holtzclaw.

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APPENDIX C

The Catoctin Furnace archaeological mitigation project  
Maryland

Report on  
Industrial Archaeological Oversight

by

Edward F. Heite  
SOPA

Consultant

Prepared for the use of Kenneth Orr, Ph.D, Principal Investigator

May 1980

## The author's role in the project

The author first became involved with Catoctin Furnace about ten years ago, when the State of Maryland first began planning its Bicentennial. Several scholars interested in the iron industry met at Annapolis to discuss the Revolutionary period furnaces in the state, and the preservation potentials of each. At that time, the author was studying the later Nassawango Furnace on the Eastern Shore.

A few years later, as the mitigation project began, Dr. Kenneth Orr asked the author to assist in the preliminary investigations.

In August of 1979, as fieldwork began on a more intensive phase of the investigation, the author and Mrs. Heite paid several visits to the site and produced several interim reports for the use of the principal investigator.

The present document is a summary of investigations conducted since August of 1979, including the following research trips:

August 12, 1979:

Visit to the site to review excavation strategy.

August 25-27, 1979:

Meeting at the site, field investigations, interviews with informants, and review of artifacts.

September 15-16, 1979:

Field investigation and on-site consultation.

November 9-11, 1979:

Field investigation, review of land records, and on-site consultation.

January 12, 1980:

Library research at Eleutherian Mills Historical Library.

February 1-2, 1980:

Review of findings with Principal Investigator.

### Outline history of Catoctin

In spite of considerable effort expended in that direction, there exists no history of Catoctin Furnace. Indeed, this author recommends that no further development take place until there is an effort to compile a comprehensive historical summary.

The Principal Investigator has asked for a skeletal outline of Catoctin's history. Based on the information available from printed sources, we have attempted to provide such a framework. Because of the time constraints, it was not possible to double check the sources cited here.

1752: Goodwill tract was patented to Charles Carroll (Little 1971).

1770: Mountain Tract patented to Benedict Calvert and Thomas Johnson for the purpose of erecting and building an ironworks (Milner 1975)

1774: The first Catoctin Furnace was constructed (Swank 1892).

1776: Nicholas Carroll conveyed Goodwill tract to Thomas and James Johnson. Johnson paid Nicholas Carroll, legatee of Charles Carroll, 100 tons of iron for Stony Park and Goodwill. The deed stated that James Johnson and Company had erected the furnace (Little 1971).

1780: Catoctin shipped artillery shells (Milner 1975)

1787: Catoctin Furnace was rebuilt, three miles up the creek, nearer to the ore bank (Swank 1892). Another source says that the new furnace was three-fourths of a mile up the creek (Alexander 1840).

c. 1792: Roger Johnson built Bloomsbury Forge, on Big Bennett's Creek about five miles above its junction with the Monocacy, where he had a finery and a chafery, producing four or five tons weekly, using "stamp-stuff" from the cinder heaps at Catoctin (Alexander 1840, p. 81). The site is near the present village of Lily Pons.

1794: Roger Johnson was residing at Bloomsbury Forge. (Maryland Gazette, January 2, 1794).

1803: Baker Johnson bought out his brother (Little 1971).

1804: The warrant for resurvey of the Mill Place tract mentions an iron roller "formerly planted as a boundary for the beginning of that tract of land" patented in 1742 (Patents 1C #Q, p. 499). The iron roller in question still is visible a few miles below the present furnace.

1808: Map shows gristmill and furnace at the site (Milner 1975)

1811: Baker Johnson died and the property was advertised for sale; a division of the estate was prescribed in the will (Milner 1975). This division of the property clearly separated the ironmaking portion from the Auburn lands. A plot of the dividing line, on a modern base map, would locate several important sites and define the limits of the iron-works as they existed in 1811.

1812: Catoctin Furnace was sold to Willoughby and Thomas Mayberry of Philadelphia (Little 1971)

1820: John Brien bought the furnace (Little 1971).

1827: Moravian missionaries from Graceham were invited to preach to the Negroes at the furnace, who supposedly had no other source of religious instruction (Milner 1975). This passage has considerable importance in relation to the cemetery excavations.

1831: Catoctin Furnace was again rebuilt (Swank 1892). The capacity was 1,700 tons a year (Lesley 1859). We cannot determine, from the secondary sources, exactly what constituted a rebuilding. Later directories continued to refer to the earlier stack as having been built in 1775.

1835: Hearth stoves were purchased (Letter, Brien to McPherson, February 2, 1835).

1843: John McPherson and others sold Catoctin to Peregrine Fitzhugh (Little 1971). John McPherson Brien obtained the Auburn property (Milner 1975).

1848: The warehouse plot and other land was purchased by the Auburn owners. The eastern boundary of this tract was drawn to exclude the stream, the pond, and the forge site from Auburn. The warehouse was on the left of the driveway near the gate. There is reference to a gate near the "forge where castings were made". (MacPherson 1957) If this transaction can be plotted on our modern base map, many factors in the 1979 excavations will be clarified.

1853: The bellows house was improved. Here again, we need to examine the original source. How many bellows houses existed?

1856: According to later accounts, a furnace was built at this time (see 1874, below). In the same year, Fitzhugh took Jacob Kunkel as a partner (Little 1971).

1858: Isaac Bond's map shows an old forge. Kunkel became sole owner (Little 1971). The Milner and Little reports do not agree on the first name of Mr. Kunkel; such rudimentary historical facts should not be left in doubt at such a late date in the project.

1859: Lesley listed two charcoal furnaces, one hot blast and one cold blast (Milner 1975).

1860: The census of manufactures listed a steam driven foundry, a smith shop, a wheelwright, a saw mill, a steam flour mill, and a post and rail plant. Steam is mentioned in connection with the furnace (Milner 1975).

1873: Deborah Furnace, a steam and water powered hot blast anthracite furnace, was built by Kunkel, according to Little (1971). Curiously enough, the anthracite furnace does not appear in the later directory entries cited below. There is a picture of an anthracite furnace, but its date of construction remains unclear.

1874: Catoclin was listed in a directory as having two charcoal stacks, one 32' by 8½', and the other 32' by 9', built in 1775 and 1856, employing warm blast and both steam and water power (American Iron and Steel Association 1874, p. 26). This entry fails to mention the 1831 rebuilding, and mentions the 1856 furnace as if it were the newest structure.

1876: J. B. Kunkel was taxed for three furnaces (Little 1971).

1884: Catoclin was listed in a directory as having two charcoal stacks, one 32' by 8½', and the other 32' by 9', built in 1775 and 1856, employing warm blast and both steam and water power (American Iron and Steel Association 1884, p. 35). The Deborah Furnace still has not appeared in the directory.

1885: Kunkel's heirs reorganized the furnace company (Little 1971).

1886: Monocacy Valley Railroad built (Little 1971).

1887: The Catoclin Iron Company went bankrupt (Milner 1975).

1887-1892: Catoclin Mountain Iron Company operated furnace (Little 1971).

1890: One of the older stacks was dismantled (Little 1971).

1892-1899: Furnaces idle (Little 1971)

1899: Blue Mountain Iron Company bought the property (Little 1971).

1900: Anthracite stack enlarged (Little 1971).

1903: End of furnace operations (Little 1971).

1906: Joseph Thropp bought the furnace and began dismantling it (Little 1971).

1912: Ore mining operations ceased (Little 1971).

#### Note on the Chronology

A cursory scanning of this chronology will reveal a number of discrepancies; they have been included, without comment, to point up the need for further documentary research. Since this list is derived primarily from secondary sources, errors in interpretation have necessarily crept in. The extremely important reference to hearth "stoves" was transcribed in one place as "stones". If the word is indeed "stoves," Catocin could have been a very early example of warm blast ironmaking.

It is evident that each new operator brought new technology and new ideas about business arrangements to the furnace; whenever the property changed hands, there was a spurt of construction activity. It is therefore logical to tie the archaeological interpretation to phases congruent with changes in ownership. Little's chronological chart is therefore the framework upon which to build future interpretation.

### Catoctin in perspective

If we are to consider Catoctin in the light of ironmaking history and in the context of Frederick County, it is necessary to make a few projections and conjectures. Some of these suggestions may seem irrelevant, but they are presented as avenues for future research and ideas for departure from the present line of work.

During the pre-revolutionary era, iron ore at Catoctin may have been worked in bloomery forges, which could refine small quantities of wrought iron from surface-mined ores. Remains of such bloomeries should be found along streams near farmsteads, possibly on sites later occupied by gristmills and sawmills. Because of their scale, bloomeries would not involve large raceways or elaborate ranges of service structures.

J. H. Alexander, in his 1840 report on Maryland iron, reported that Roger Johnson had run a forge with a finery and chafery, refining "stamp-stuff" from the cinder heaps at Catoctin. This was Bloomsbury, on the other side of Frederick. James Johnson, Alexander's informant, said that the Bloomsbury forge operated only a year or two but produced four or five tons of iron a week. Roger Johnson was at Bloomsbury in 1794, when he placed an advertisement in the newspaper, attempting to sell some of his interests.

Recovery of iron from furnace waste was not a new idea; Peter Hasenclever had tried the same thing in New Jersey.

Catoctin interests operated a rolling and slitting mill at Reel's Mill and a forge on Bush Creek before the end of the eighteenth century. Where was Reel's? Was it the Mill Tract where a roller was sunk in the ground before 1804? The Mill Tract should be plotted and carefully surveyed.

Rolling and slitting mills were important during the eighteenth century, since all our processed sheet materials had been coming from England under the terms of the Navigation Acts. Clandestine mills operated before the Revolution, but during and after the war they were sorely needed. Elk Forge, near the modern Elkton, used rolls made at Hagley on the Brandywine nearby. It is therefore possible that the rolling and slitting operation was a few miles down the creek.

Vertical integration was typical of the larger American iron companies; Alexander Spotswood operated an "air furnace" or cupola at Massaponax in Virginia to recast pigs from his Tubal Works, about 1730. The large Principio Company operated furnaces and foundries in several colonies.

Every iron furnace was part of a network of itinerant ironmakers, who quickly spread new ideas throughout the iron-making community. Several of the men who ran Catoctin were interested in other furnaces, or had been born to the trade. The reference to stoves, less than five years after warm blast was introduced, is therefore not surprising.

Since primary ironmaking at a blast furnace is a seasonal occupation, it is not surprising to see other seasonal industries using the same head of water. Gristmills, for example, will need the water at a different time of year. However, at Catoctin, the gristmill used steam, possibly as an auxiliary power source. By 1848, the hydraulic system had begun to shrink.

Excavations at the "old forge" site to date have been inconclusive, primarily because only a small portion of the site was excavated. There are clearly three phases present. Near the "niche" in the dam is a large body of glassy slag fill, apparently covering a deep pit; tradition places a large ruined building on this location late in the nineteenth century.

Nearby is a complex of superimposed roadways, sealing another site that was not filled with glassy slag; slag is almost completely missing from the roadways and the site beneath them.

The site under the roadways is apparently a water-powered forge, built in several phases, and abandoned before the middle of the nineteenth century. On the west side of this structure, many vents from castings were found. On the floor of the structure, a thin film of iron oxides indicates hammering or remelting activity.

If the site is ever excavated, it probably will reveal a small foundry, chafery, and finery built when the property was part of the furnace lands. This structure was demolished and covered by the road leading to Auburn. Then, at a later date, a large cupola was built nearby, and the dam was raised to provide a better source of power for its bellows. Such a scenario can be confirmed only by complete excavation of both sites.

The introduction of anthracite before the coming of the railroad is another interesting phenomenon. Anthracite is heavy, and must have been shipped by wagon from the railhead. The economics of an isolated anthracite furnace would be an intriguing story. Perhaps this situation explains in part why the company collapsed the year before the railroad reached the site.

Did the owners of Catoctin Furnace try to get a railroad to their property before the Monocacy Valley line was built? In other areas, ironmakers were among the biggest backers of railroad projects. Surely there were many railroad proposals during the half-century after the rails reached Frederick. This subject deserves considerable thought and research.

Catoctin's end products remain a mystery. While iron castings often bear makers' marks, many cast iron items and all wrought iron pieces are unmarked. The presence of a secondary refining process indicates that more than pig iron came from Catoctin. Milner's 1975 report contained illustrations of fancy goods, which generally were signed; such illustrations, presented uncritically, tend to give the wrong impression about what an ironworks produced.

The number of furnaces at Catoctin is a continuing mystery. If all three blast furnaces were operating at one time, the need for steam power can be readily explained. Even two furnaces would tax the resources of a water power system. However, it is possible that the assessment record refers to one or two blast furnaces and one or two cupolas, for a total of three. At this point in our research, we are unable to determine when each furnace was operating, and where the original furnace stood. In the chronology given above, construction or reconstruction dates of 1774, 1775, 1787, 1831, 1856, and 1873 appear. The furnaces are variously reported to have been dismantled in 1787, 1890, and 1906. Someone must review the evidence critically. We cannot continue to use six construction dates, three destruction dates, and one surviving furnace stack. It simply does not compute.

Pig iron is a useless product. It must be converted into something else before it can be sold to the end user. The isolation of Catoctin suggests that the refining processes were conducted nearby, perchance at Frederick, at Bloomsbury, or at installations along the Monocacy and its tributaries. A study of the industrial history of the region would shed some light on the relationship of Catoctin with the rest of the iron industry in Frederick County.

### Interpretative Proposal

Only a small part of the industrial history of Catoctin remains above ground. The bare stack, a few earthen berms, the remnant of the village, a magnificent ruined mansion, and a few relics are all that exist in visible condition. Documentary remains are similarly scanty. For many important historical points, the evidence is utterly lacking.

The best summary to date, the Little study of 1971, has been eclipsed by new findings, but it remains the only reliable source on the history of the furnace. There is a definite need for a new study, to include:

A complete search of the available documentary sources on land use and ownership, in the form of an historical atlas.

A reconnaissance of all the related sites in the neighborhood, regardless of their present ownership. Such a study is essential to the interpretation of the sites in public hands.

A technological interpretation of the history of Catoctin in the light of surviving relics and structures.

A solid, scholarly, summary history of the area.

Catoctin could be used to interpret the history of the iron industry in America. It was once considered for that mission, when the decision was made to develop Hopewell Village instead.

Like Hopewell, Catoctin illustrates a series of technological events in the history of American ironmaking. It had a role in the Revolution, and possibly in every war from then until the end of the nineteenth century.

Unlike Hopewell, Catoctin has lost certain important illustrative features, such as the ironmaster's house, the records, the anthracite furnace, and various support buildings.

In the overall inventory of ironmaking sites, there are better properties in the region. Cornwall in Pennsylvania has extensive surviving ancillary buildings. Principio retains some of the flavor of an ironworks, with much greater antiquity. Nassawango still has its pioneer warm blast heater. These other sites must be considered while planning for Catoctin's interpretative role.

### Recommendations

Catoctin Furnace, as a tourist attraction and teaching facility, cannot be developed through a series of non-resident contract studies. This piecemeal approach has to date produced a vast amount of information and artifacts, filed away in many different places.

Mitigation and development of parts of the site have been treated as objectives, rather than as parts of a whole program. The time has come to synthesize the knowledge to date, and to establish long-range development goals.

While mitigation is an admirable objective, it contributes little to the sum of knowledge until the mitigation studies are incorporated into a broader effort. Such an effort must be planned, with precisely-defined objectives and purposes. Without such long-range statements of purpose, it is difficult at this point to recommend further expenditure on research and development.

The fragmented contract approach has clearly reached the limits of its utility at Catoctin. What we need now, is synthesis.

APPENDIX D

THE FEASIBILITY OF THE MONITORIZATION OF BURIED SITES  
BY INSTRUMENTATION AT THE CATOCTIN FURNACE HISTORIC DISTRICT

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# THE FEASIBILITY OF THE MONITORIZATION OF BURIED SITES BY INSTRUMENTATION AT THE CATOCTIN FURNACE HISTORIC DISTRICT

## Background

Two types of potential impact on archaeological resources by impending road construction were identified by the intensive survey (Orr and Orr, 1977, Table 1, p. 89): (1) incising, and (2) overlay. The road construction requirements in incising impacts necessitated the removal of some or all of the archaeological materials. In the overlay impacts, however, the road bed required fills ranging from a few feet to a dozen feet or more to raise the ground level and hence to bury more deeply the archaeological resources. Of the forty-two features identified in 19 check locations in that survey only two were seen to be threatened by impending incising impacts involving only 20% and 10% respectively of the features to be affected. The report concludes: "The remainder (of the sites) will be sealed-off by a layer of construction fill. Some of these (overlay) impacted sites may be available to continuous archaeological work, such as those in easement areas with slight or no overburden. Others may be available for archaeological research after a number of years (when the road ceases to be). All sites will continue to be archaeological resources subject to protection and utilization as the occasion allows." (Ibid, p.93). Check 3, iron-working site (18FR320) is a good illustration of a site consisting of a thin stratum of house foundations protected by several layers of fill from previous road constructions.

These challenging statements were met with some skepticism and a great deal of interest in what actually happened to buried sites. In the Memorandum of Agreement between the Advisory Council on Historic Preservation and the Maryland State Highway Administration (May 24, 1978) it was specified that the SHA would provide a "Design of a monitoring program to assess the effect of site excavation and burial on sites within the District" (Advisory Council of Historic Preservation, 1978, p.2). The Consultant was required, in conjunction with the Advisory Panel, to consider the feasibility of a monitoring program and to recommend specific areas to serve as test sites to assess the nature of the road construction overlay impact on archaeological resources (Technical Proposal paper, p. 3 in Supplemental Agreement between Orr and Son and SHA dated May 13, 1979).

A series of meetings with Advisory Council, SHA and Advisory Panel during 1979-80 raised the following questions about monitorization: What is the good of it? How is monitorization achieved? How and who will benefit? What is the end product? Is direct monitorization at all times necessary? Who will do it? How much will it cost? Is there a model? Some of the answers to these questions were forthcoming as a result of considering the Catoctin Furnace

sites, in talking with interested specialists and in consulting some of the literature.

### The Practicality of Monitorization

If it could be demonstrated that road construction over an archaeological site actually protected it rather than destroying it, much of the costly "mitigation and salvage" operations now being undertaken would not be needed. Instead of extensive and expensive excavations only surveys would be necessary to identify the nature and extent of the site being temporarily put in "storage" under the road. This situation would result in contributions to the science of archaeology in two ways: (1) such sites would be marked as resources for future investigations to be undertaken as the need for the data they contained became imperative scientifically, and (2) the currently overtaxed laboratory facilities used to store an increasingly burdensome mass of excavated materials would be relieved. This would result in a saving of money for more precisely considered research and the saving of priceless in situ data for future archaeological investigations with improved techniques of analysis and sense of problem. The result would be a management of archaeological resources rather than the present haphazard and often confused collection of duplicate data and information. The archaeological data banks could be tapped when needed with the bulk of the "pages of the past remaining in its pristine in situ state. Thus the American heritage of archaeological resources would be conserved and wisely used, the highway administration would correctly be seen as a benefactor of the science, and archaeology could increasingly pursue its fieldwork from a sense of problem rather than as an emergency salvage operation.

The end product of monitorization therefore is a knowledge of the exact effect produced by overlay impacts on a site. Is the overlay protective or destructive. Whereas this question is clear in the case of an incising impact in which the archaeological resources are to be destroyed - we don't know the effect of the overlay impact. Does the fill and concrete overburden compress, and distort archaeological stratigraphy? Does vibration from the traffic pulverize artifacts? Does the chemistry of the site change for the worse? and similar questions.

### Site Development

Archaeological sites may be considered as systems composed of two components: (1) the cultural component, and (2) the natural component. Each system has its inputs and processes. Cultural inputs include stone, iron, ceramics, glass, human, animal and plant remains, and cultural features. Cultural processes include deposition and alteration of sediment and cultural materials by man-made forces. Natural inputs include sediment, stone, plant and animal remains. Natural processes include deposition and disturbance of sediment, alteration of cultural materials, weathering (decay), burial,

transfer, etc. Outputs of these subsystems are composed of altered cultural and natural materials as well as the depletion of categories of cultural materials. The site development process is an overall trajectory of the total site system through time. The end result of the continual attrition of destructive process in site development is the eventual disappearance of most of the cultural material. Archaeologists are universally concerned and interested in understanding site development since each is obliged to attempt to reconstruct the original cultural subsystem of the site from its remains.

Pedology, the soils science, along with geology as a whole provides the functional factors in the natural component of our study. These factors are: climate, relief, organisms, parent material, and time (Jenny, 1941, 1946, 1961 in Wildesen, 1973). Wildesen believe that by adding the factor "culture" to Jenny's five soil forming factors, it is possible to explain the observed archaeological data qualitatively, but more accurately than has been possible heretofore (Wildesen, 1973, p. v). I am grateful to Dr. Wildesen for sending her Ph.D. dissertation which proved invaluable in providing an important part of our monitorization model. She kindly professed as interest in our monitorization plans inferring that the idea was an excellent one which everyone talked about but no one got around to doing.

#### Archaeological Site Development at Catoctin Furnace

The dualization of U.S. Route 15 through the construction of the Alignment 1 road bed is one more cultural input in a long line of such inputs which have modified the site throughout its nearly 150 years of occupation. Others have been the construction of the existing U.S. 15 route in 1960, land promotional changes (deer park and lakes) undertaken by Lanceolot Jacques in the 1920's, the fish pond industry which started in the 1920's and continues in the neighborhood to the present time, and a series of successive developments of the iron industry seen in the remains of water power systems (raceways), mines, ore washings and slag piles, furnaces, foundries and forges, and associated buildings of many functions. Each cultural input of materials and processes has had a greater or lesser effect on preceding stages in the Catoctin Site development. The archaeologists of the future (say 1000 years hence) may well find the dualization remains of equal importance to the iron industry features. They may also ponder, as we now do, in trying to figure out the effect this overburden had on the iron industry features and materials beneath it.

We know that fill in the form of local earth will be placed over the site features in a blanket ranging from a few to a dozen or more feet. We also know that new channels will be provided for covered over springs. The road will be used by high speed traffic for many years - a potential source of destructive vibrations. We want to know the nature of the processes which will affect for better

or for worse, 95% of the sites in the heart of the site complex.

A Site for Monitorization  
Check 4, Feature 1 (18FR 321)  
The Spring-Bathhouse Site

The Spring-Bathhouse Site was selected by the consultant with the assistance of the Advisory Panel because in addition to containing a majority of the types of features encountered in the site as a whole, it occupied a median position in regard to chronology and depth of fill anticipated in the dualization construction (see p. ). In addition to site has the problem of springwater drainage, a common problem at Catoctin Furnace site. Approximately 7 feet of overlay fill may be anticipated.

The changes to be anticipated in the buried site as a result of road construction include: water-control problems, chemical content, torque-strain, compression, and vibration. These changes could result in differentially skewing the archaeological features, compressing the atratigraphy, accelerating decay and oxidation of cultural material and shattering or shredding such material by vibrations conveyed from the road surface to the buried archaeological resources. On the other hand a euphoric situation might obtain for any or all of the conditions of features and cultural material which would be an improvement over the present situation in regard to the conservation of archaeological resources. Again, it is possible that the presence of the road above the site would have caused no significant change in any of the antiscipated areas.

Specific equipment or adaptable items for identifying and recording changes due to the overlay impact on the site are believed to be now in use by highway soils and foundations engineers for similar purposes in monitoring strata and features under newly constructed road beds (communications with David Martin, Soils and Foundations engineer, Maryland SHA, Spring, 1980). Such instruments include: piezometers for measuring pore water, isismic geophone for measuring torque-strain, PH probe for measuring acidity and other instruments for measuring vibration and chemical content. It is understood that such equipment may be read by remote control of electrical cables, can be wired to graph recorders. They are described as readily available, relatively cheap, and easy to install. It is visualized that a cement bunker erected near the buried site on the right of way or easement land controlled by SHA, could function as a vandal-proof data collecting center.

The site shall be prepared for burial and monitorization by fixing instrument terminals and cables in position, setting up concrete bunker, digging standard ditches for stabilizing flow of spring water, and covering the site with concrete-making sand to specifications of SHA soils and foundations engineers (e.g. fill foundation and cover site walls to prescribed height). Data required on "before change" should be gathered prior to fill-in.

The Data gathering, assisted by SHA soils and foundations engineers in regard to reading instruments and research archaeologists in regard to interpreting the results archaeologically, should start before site fillin and construction and continue to a given period during final construction and use of the road. The analyst-in-charge will determine when significant change ceases or a trajectory of change has been established. It is believed that a 2 year period of data gathering by graphs on bi-weekly settings with monthly evaluation of data will be adequate. With the cooperation of the SHA Bureau of Soils and Foundations the monitorization program, the first such program to be attempted in archaeology, can be completed for under \$20,000.

### Summary

A monitorization program based on cooperation between the SHA Bureau of Soils and Foundations and archaeologists at Catoctin Furnace site is feasible and may be successfully carried out for a modest amount of money and effort. The program challenges the current belief that any kind of impact on archaeological resources by road construction is necessarily deleterious and must be mitigated by salvage excavation as if the resources were to be destroyed or forever lost by the action of the road construction. There is strong evidence to indicate that a high proportion of impacts (95% at Catoctin Furnace site) actually are overlay impacts wherein the road fill has been known to protect rather than harm the desposits.

The monitorization program suggested for the Spring-Bathhouse site would, on the one hand, would work with SHA soils and foundation engineers, using their implements for measuring the same factors that are involved in subsurface road monitorization. On the other hand, the program would work with site development archaeologists whose current contributions to the science are recognized as vital for archaeological interpretations.

The effort is a pioneer one and if successful, as we believe it will be, will show for the first time the precise effect of overlay impacts on archaeological resources. Since the road builders are, by law, liable only for the harmful effect of such impacts, they will save large sums of money now spent on removing resources which are erroneously believed to be threatened by road construction overlay impacts. Archaeology stands to gain immense reservoirs of resources which remain in situ for future research, instead of the present situation of overcrowded labs and warehouses filled with often unused collections of duplicate material.

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August 1977. An Intensive Archaeological Survey of Alignment 1 Corridor, U.S. Route 15 from Putman Road to Maryland Route 77 in Frederick County, Maryland. Fredericksburg, Va.

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## APPENDIX E

TABLES 3-10 Provenance and Frequencies of  
for Feature 1, Check 4 Spring-Bathhouse <sup>and/or removed</sup>  
~~and~~ <sup>including</sup>  
Analysis of Common Birch.

Appendix E

Table 3, Check 4, Feature 1, Cultural Material  
From Beneath Bathhouse Floor

(Test Pit 8, Trenches 8, 8A, 9, 10, 11, 11-11A, 12, TP14)

Cultural Material	Layers (L)					Features (F)										Total
	1A	2B	3	3A	3B	Top 1B	Bot. 1B	1E	1I	1N	1P	1S	1V	1W	1X	
<u>IRON</u>																
Nails <sup>1</sup>																
Not Identified			33			3	1			68	2	6			2	115
(Machine Cut)																
Wrought Head <sup>2</sup>		1														1
L Head <sup>3</sup>		1				5										6
T Head <sup>4</sup>		4	1			23				3	1	1				33
(Wrought)																
Brads <sup>5</sup>						2										2
(Drawn)																
Round <sup>6</sup>						4										4
Miscellaneous																
Fixture for																
Bathtub?											1					1
Kettle Leg &																
Part of Pot			1													1
Knife Blade													1			1
Bar Fragments						15	59									74
Circular Ring							1									1
Total		6	35			52	61			71	4	7	1		2	239
<u>GLASS</u>																
Bottle																
Green					2		1				3					6
Amber <sup>7</sup>					1					39						40
Clear, Thin										18						18
Window																
Green, 1/16"	19					2					1					22
Total	19				3	2	1			57	4					86

<sup>1</sup>Types and Dates from Nelson, 19... <sup>2</sup>1790-1820's. <sup>3</sup>1815-late 1830's. <sup>4</sup>Late 1830's-Present. <sup>5</sup>17th-19th centuries. <sup>6</sup>Late 1800's-Present. <sup>7</sup>Impressed base and neck seam included - early 20th century.

Table 3. (Continued)

Cultural Material	Layers (L)					Features (F)										Total
	1A	2B	3	3A	3B	Top 1B	Bot 1B	1E	1I	1N	1P	1S	1V	1W	1X	
<u>CERAMICS</u>																
Pearlware																
Blue Shell-edge <sup>8</sup>			1													1
Green Shell-edge <sup>9</sup>				1												1
Hand Painted <sup>10</sup>			1	3												4
Hand Painted <sup>11</sup>				2												2
Plain <sup>12</sup>					1											1
Pearlware <sup>24</sup>					1											1
Painted Whiteware <sup>13</sup>							1									1
Blue Transfer Print <sup>14</sup>			4	2												6
White Molded "China" <sup>15</sup>				1												1
Transfer Print Whiteware <sup>16</sup>		1														1
"Blue Willow" <sup>17</sup>				2		2										4
Transfer Print <sup>18</sup>											1					1
Hand Painted Underglaze (White) <sup>19</sup>				2												2
Whiteware <sup>20</sup>				1		3				8		3				15
Late Creamware <sup>21</sup>			3	2												5
Local Redware <sup>22</sup>		2	16	11	2	21			1	7				1		61
Stoneware <sup>23</sup>			3		2		4			5						14
Total		3	28	27	6	26	5		1	20	1	3		1		121
<u>WOOD</u>																
Board Fragment				1	1											2
Fragments			3							30			9	1		43
Total			3	1	1					30			9	1		44

8 (Note: all ceramics from analyses of Ms. Betty Cosans, Project Ceramist) Pre-1840. 9Pre-1840. 101820-30. 11Pre-1850. 121820-50. 13Pre-1850. 141860-. 151830-1860 plus. 161830-. 1719th century-present. 18Late 19th century-20th century. 191850-. 201820's-?. 21Pre-1850. 2219th-20th centuries. 2319th-20th centuries. 24 1820-60 (under trough)

Table 3. (Continued)

Cultural Material	Layers(L)					Features ((F)										Total
	1A	2B	3	5A	3B	Top 1B	Bot. 1B	1E	1I	1N	1P	S. 1S	1V	1W	1X	
MISCELLANEOUS																
Mortar		7	19			8				2	2					38
Plaster		2	13			4				7	3	24				53
Brick <sup>25</sup>	7	16	24	21	2	68	4		4	15	7	4	36		14	562
Charcoal		1	26		26	10			1	27	1	5				97
Slag	10	7	11	5	18	28			1	71	23	3		4	4	284
Flagstone																
Spalls	44	6	5			2	1			4	1					63
Limestone																
Flux?										3						3
Iron Ore		2	19			46				19	5	2		3	2	98
Lead Window																
Came						1					1					2
Clay Pipe					1											1
Stem 1/16"																
Clay pipe -					1											1
Bowl base																
<u>Total</u>	61	41	43	1	55	167	5		6	290	40	70		7	20	1202
<u>GRAND TOTAL</u>	80	50	505	29	65	247	72	0	7	468	49	80	10	9	22	1693

<sup>25</sup>Five whole brick samples taken from Top FlB (2) and S.FlS (3).

<sup>26</sup>Under trough.

Table 4: Check 4, Feature 1, Artifacts Above Bathhouse Floor  
(Test Pit 4; Trenches 4AN,W,E,S, Quards Ne, NW, SE, SW)

Cultural Material	Layer 1	Layer 2	Between Floor Stones	Open Space	In Wall	Total
<u>IRON</u>						
Nails <sup>1</sup>						
Not Identified		4				4
(Machine Cut)						
Wrought Heads			1			1
L Head(1815-L.30's)		3	4			7
L Head(1805-20)		1				1
T Head		1	22			23
(Wrought)						
Square	1		1 (Brad)			2
(Drawn)						
Round		3	1			4
<u>Total</u>	1	12	29			42
<u>GLASS</u>						
Bottle						
Clear, body)				9		9
Neck & Lip						
(Seam to Lip)				1		1
Amber, body					1	1
Blue~, impressed ba-						
se,raised letters <sup>2</sup>		1				1
Neck,metal twist						
cap,seam-lip <sup>3</sup>		1				1
Body		33				33
Bowl)						
Ornate-cut		4				4
<u>Total</u>		39		10	1	50
<u>CERAMICS</u>						
(Whiteware)						
Blue Transfer Print <sup>4</sup>		2				2
Whiteware, Plain <sup>5</sup>		5				5

<sup>1</sup>See Table 1 footnotes for chronology. <sup>2</sup>Medicine c.1867.  
<sup>3</sup>20th century. <sup>4</sup>19th century, pre-1860. <sup>5</sup>1820-1900+.

Table 4. (Continued)

Cultural Material	Layer 1	Layer 2	Between Floor Stones	Open Spaces	in Wall	Total
<u>CERAMICS (Contd.)</u>						
Plain White Procelain <sup>6</sup>		2				2
Transfer Print, floral pattern, unidentified		1				1
Total		10				10
<u>MISCELLANEOUS</u>						
Sheet metal, torn over wood <sup>7</sup>		2				2
Metal paint top		1				1
Button		2				2
Shoe Heel	1					1
Tin can	2					2
Wood with round nail	1					1
Shot gun shell		1				1
Mortar Samples	14	1				15
Plaster		7				7
Brick, Frags	3	1	26			30
Totals	21	15	26			62
Grand Total	22	76	55	10	1	164

<sup>6</sup>19th-20th centuries    <sup>7</sup>3 round and 3 cut nails

Table 5. Check 4, Feature 1, Artifacts from  
Test Pit 13

Cultural Material	Layers						Totals
	1A	2B	3	4	5	6	
<u>IRON</u>							
<u>Nails</u>							
(Machine Cut?)							
With wood adhering			3				3
Not Identified			2				2
<u>GLASS</u>							
<u>Bottle</u>							
Olive Green						1	1
Clear		2					2
<u>CERAMICS</u>							
Stoneware		2					2
<u>MISCELLANEOUS</u>							
Pounded earth Fragments (old floor)						7	7
Mortar	1						1
Plaster	1						1
Brick		1	23				24
Charcoal		3	3				6
Slag		1	34				35
Flagstone		4	1				5
Wood Frag.			1				1
Iron Ore Frag.		1	1				2
<u>Totals</u>	2	14	68			8	92

119th-20th C

Table 6. Check 4, Feature 1, Artifacts from Outside Bathhouse  
(Test Pit 1, Trenches 1, 1A)

	Layers							Features			Total
	1	2	Top 3	3	3A	4	5	6	1C	1Q	
<u>Cultural Material</u>											
<u>IRON</u>											
<u>Nails</u>											
(Machine Cut)											
Wrought Head <sup>1</sup>				2							2
T Head <sup>2</sup>				3					13		4
Not Identified				1					2		3
<u>Miscellaneous</u>											
Knife blade(?)									1		1
Barbed Wire <sup>4</sup>			2								2
Iron Hoe										1	1
<u>Total</u>			2	6					4	1	13
<u>GLASS</u>											
<u>Bottle</u>											
Olive Green									1		1
Clear		1							2	1	4
Metal Screw Top			1								1
Light Green, Stri- ations.							1				1
Dark Green, Stri- ations										1	1
Aqua Clear, letters "Carter's 8" <sup>5</sup>						1					1
Light Green							1				1
<u>Window</u>											
Green Tinge 1/16"			1								1
Clear Green 3/32"	8										8
Clear 1/16"									1		1
<u>Total</u>	8	1	2			1	2		4	2	20

<sup>1</sup>1815-1830's.    <sup>2</sup>Late 1830's to Present.    <sup>3</sup>Top of FlC

<sup>4</sup>Late 19th Century - Present.    <sup>5</sup>Post 1867.

Table 6. (Continued)

Material Culture	Layers							Features		Total	
	1	2	Top 3	3	3A	4	5	6	1C		1Q
<u>CERAMICS</u>											
Blue Transfer <sup>6</sup> Print				1			1				2
Pearlware <sup>7</sup>									1		1
Redware <sup>8</sup>					2	2			6		10
Stoneware <sup>9</sup>						1			2		3
<u>Total</u>				1	2	3	1		9		16
<u>MISCELLANEOUS</u>											
Tar Paper <sup>10</sup>		9	6								15
Mortar, White Cement-lime <sup>11</sup>			6						8	1	15
Plaster		13	28	3							44
Slag			4	6	2						12
Iron Ore			2			1					3
Flagstones			2	2	3	2			1		10
Brick				6	4	7			4		21
Soil Samples			1				2				3
<u>Total</u>		22	49	17	9	10	2		13	1	123
<u>Grand Total</u>	8	23	53	24	11	14	5		30	4	

<sup>6</sup>19th C. pre-1860. <sup>7</sup>1820-40. <sup>8</sup>17th-20th C. - most likely  
<sup>9</sup>19th C. <sup>10</sup>20th C. <sup>11</sup>Prob bly late 19th C.

Table 7. Check 4, Outside Feature 1  
Artifacts from Outside Bathhouse  
(Test Pit 2, Trench 2-2A)

Cultural Material	Layers							Features				Total
	1	2	3	4	5	6	7	Top 1C	1C	1R	1D	
<u>IRON</u>												
<u>Nails</u>												
Not Identified					2			5	7	2	3	19
(Machine Cut)												
L-Shaped <sup>1</sup>		2										2
Wrought Head <sup>2</sup>		1										1
T-Head <sup>3</sup>												
<u>Miscellaneous</u>												
Shovel Handle Part									1			1
Iron Flake from												
Iron Grate	1											1
<u>Total</u>	1	3			2			5	8	2	3	24
<u>GLASS</u>												
<u>Bottle</u>												
Amber								4				4
<u>Window</u>												
Clear 1/16th"												
thick		1										1
Clear, 3/32"												
Thick								1				1
Green Tinge, 1/32"												
Thick		1										1
Green Tinge, 1/16"												
Thick									1			1
<u>Total</u>		2						5	1			8
<u>CERAMICS</u>												
Oriental Import												
Painted Por. <sup>4</sup>								1				1
Blue Transfer												
print <sup>5</sup>									1			1
Redware <sup>6</sup>								10	20	1		31
Stoneware <sup>7</sup>									3	8		11

<sup>1</sup>1805-1820.   <sup>2</sup>1815-1830's.   <sup>3</sup>Late 1830's-Present.   <sup>4</sup>Late 18th-  
Mid-19th C.   <sup>5</sup>19th C. Pre-1860.   <sup>6</sup>17th-20th C.   <sup>7</sup>19th-20th C.

Table 7. (Continued)

<u>Cultural Material</u>	1	2	3	4	5	6	7	Top 1C	1C	1R	1D	Total
<u>CERAMICS</u>												
<u>Total</u>								11	24	9		44
<u>MISCELLANEOUS</u>												
Mortar		4									8	12
Plaster		17						2	1	11	12	43
Slag				4	8	1		14	14		6	47
Brick		5		17 <sup>12</sup>	5	1		69	32	59	26	214
Iron Ore		4		4	2			5	7	1	4	27
Flagstone				1 <sup>13</sup>		13		4			3	21
Charcoal								6	11		5	22
<u>Total</u>		30		26	15	15		100	65	71	64	386
<u>GRAND TOTAL</u>	1	35		26	17	15		121	98	82	67	462

<sup>12</sup>Plus 1 whole brick.   <sup>13</sup>Slate.

Table 8. Check 4, Feature 1, Test Pit 3  
and Trench 3

Cultural Material	Layers			Total
	1	2	3	
<u>GLASS</u>				
<u>Bottle</u>				
Olive Green		1		1
<u>CERAMICS</u>				
Pearlware, Blue Shell- edged <sup>1</sup>		1		1
Redware <sup>2</sup>		14	1	15
Stoneware <sup>3</sup>		1		1
<u>MISCELLANEOUS</u>				
Slag		2		2
Iron Ore		3		3
Brick		9		9
Shell			1	1
GRAND TOTAL		31	2	33

<sup>1</sup>Late 18th C., pre-1840.   <sup>2</sup>17th-20th C.   <sup>3</sup>Prob. 19th-20th C.

Table 9. Check 4, Feature 1.  
Artifacts from Test Pit 5  
And Trench 5, 5A.

Cultural Material	Layers					Feat.	Total
	1	Bot. 1	3	3 A	4	1J	
<u>IRON</u>							
<u>Nails</u>							
Not Identified	1	1	9	2			13
Spikes <sup>1</sup>		1	1				2
(Machine Cut)							
Wrought Head <sup>2</sup>					1		1
T-Head <sup>3</sup>	2		2		1 <sup>4</sup>		5
<u>MISCELLANEOUS</u>							
Metal Pocket Knife					1		1

<sup>1</sup>1804-20.   <sup>2</sup>1815-1830's.   <sup>3</sup>Late 1830's-Present.   <sup>4</sup>possibly burrow.

Table 9. (Continued)

	Layers					Feat.	Total
	1	Bot. 1	3	3A	4	1J	
Cultural Material							
IRON MISC. (Contd.)							
Large Iron Plating			1				
<u>Total</u>	3	2	13	2	3		23
GLASS							
<u>Bottle</u>							
Amber		1 <sup>4</sup>					1
Clear, Molded Pattern		1					1
Clear, Goblet		1					1
Clear, lip & neck, 2 seams to lip <sup>5</sup>	1						1
Button, White <sup>6</sup>		1					1
<u>Total</u>	1	4					5
CERAMICS							
Pearlware, blue-shell edge <sup>7</sup>				2			2
Redware <sup>8</sup>	2	5	3	1			11
Chinese Import <sup>8</sup>				1			1
Mocha transfer Print <sup>9</sup>	1						1
Whiteware <sup>9</sup>			7				7
<u>Total</u>	3	5	10	4			22
MISCELLANEOUS							
Wood Post with poss. White Paint						1	1
Slag	2	1	4	2			9
Plaster							
Mortar			2		2		4
Brick	2		1			1	4
Iron Ore			1				1
Charcoal			1	1			2
<u>Total</u>	4	1	9	3	2	2	21
<u>GRAND TOTAL</u>	11	12	32	9	5	2	71

5c.1900. 6Late 19th C. 7Prob. 19C, pre-1840. 8Late 18thC-Mid 19th C. 919th C.

Table 10 Check 4, Feature 1, Artifacts  
From Test Pit 6 & Trenches 6, 6A

Cultural Material	Layers									Features	Total
	1	2	2A	2B	2C	2D	3	3A	4	1L	
<u>IRON</u>											
<u>Nails</u>											
Not Identified		1					13	36	2		52
Spike							1				1
(Machine Cut)											
L-Head <sup>1</sup>				1							1
T-Head <sup>2</sup>		2		1			8				11
Round <sup>3</sup> (Drawn)					1						1
Large Iron Wedge (Sprue-gate)											
Casting Debris										1	1
Iron Droplet Casting Debris									1		1
Iron Door Handle(restored)					1						1
<u>Total</u>		3		2	2		22	36	3	1	69
<u>GLASS Bottle</u>											
Dark Green					1				1		2
Olive Green							1			1	2
Amber							1			1	2
<u>Total</u>					1		2		1	2	6
<u>CERAMICS. Or-</u> <u>iental Porcelain</u> <sup>4</sup>					1						1
Pearlware <sup>5</sup>								1			1
Blue Transfer Print <sup>6</sup>										3	3
Blue Shell- Edge Pearlwr. <sup>7</sup>							2	1		2	5
Redware <sup>8</sup>							7	53	4	3 <sup>10</sup>	67
Stoneware								1	2		3
<u>Total</u>					1		9	56	6	8	80

Table 10 (Continued)

Cultural Material	Layers						Features				Total
	1	2	2A	2B	2C	2D	3	3A	4	1L	
<u>MISCELLANEOUS</u>											
Shell					1						1
Slag		4					2	70	15	74	165
Iron Ore		1					2	8	7	11	29
Brick	1	2		3	4		17	22	16	11	76
Charcoal							3		1		4
Flagstone					12			1	1		14
Plaster		3								1	4
Mortar		11								1	12
Total	1	21		3	17		24	101	40	87	305
<u>GRAND TOTAL</u>	1	24		5	21		57	193	50	98	449

<sup>1</sup>1805-1820. <sup>2</sup>Late 1830's-Present. <sup>3</sup>Late 19thC-Present

<sup>4</sup>Late 18thC.-Mid 19thC. <sup>5</sup>1820-1850. <sup>6</sup>19thC, pre-1860.

<sup>7</sup>Late 18thC. pre-1840. <sup>8</sup>17thC-20thC. <sup>9</sup>most likely 19th-20th C.

<sup>10</sup>1 with blue glaze. <sup>11</sup>plus 1 whole brick.

Analysis of Bricks from Check 4, Feature 1,  
Spring-Bathhouse Site

The Common Brick

Of the 18 whole bricks found on the site all but two were associated with features having to do with the Middle Period when the springhouse was remodeled as a bathhouse (Feature 1V-1, south end Feature 1S-3, FlS-1, fill Layer 3-2, fill Layer 4, Trench 2-2A-1 and Feature 1X-1, and after the bathhouse's destruction (top of Feature 1B-1). The two other whole bricks were from Featuer 1L builder's trench (in Trench 6A), and the bottom of Feature 1B metal catch basin.

All the whole bricks appeared to have been hand molded, being porous with some possessing distinctive mold marks (laceration or imperfections; also sand adhering). They were orange to buff-red in color.

Four bricks averaged c. 8" long by 2 $\frac{1}{4}$ " thick by 4" wide. All came from the south end of Feature 1S. Those bricks measuring less than 4 inches in width come from the brick drain Feature 1S, the builder's trench Feature 1L, the top of Feature 1B, a sandy lobe arm of the drainage system, the middle of the bathhouse Feature 1B and from fill layer 3. The average size of such bricks is c. 3  $\frac{3}{4}$ " X 8" X 2 $\frac{1}{4}$ " (in Feature 1L the exception measured 3 $\frac{1}{2}$ " X 7  $\frac{5}{8}$ " X 2 $\frac{1}{4}$ " and was buff red in color). Only two whole bricks were reconstructed from bats found in Layer 3 inside Feature 1.

Of the 40 brick bats having 2 dimmensions which were measured almost half (17) came from the fill Layer 3 which had been put in over the springhouse floor to elevate the stone floor of the bathhouse, followed by 6 bricks coming from the destruction period (top of Feature 1B); the rest were evenly distributed among the features and layers already mentioned (except for new additions from Feature 1C and Feature 1R, stone drain). The bats (as with the whole bricks) were porous, orange to red-buff with mold markings evident in some as well as sand adhering to the sides. Twenty bats out of 40 measured under 4" wide (3  $\frac{5}{8}$ " - 3  $\frac{15}{16}$ ") and come from areas considered related to the bathhouse construction. These areas included Feature 1S, mid to bottom of Feature 1B, top of Feature 1B, south end of FlS, brick drain, fill layer 3, and the top of FlC3. The other 20 bats, 4" wide, came from fill Layer 3, south end of FlS, early builder's trench of Fl, and fill layer 4, Trench 2-2A. The average thickness for the majority of bats was c. 2 $\frac{1}{4}$ ". Their two dimmensional measurements were about the same as those of the whole bricks.

### The Firebricks

Four bats and one whole brick were identified as firebricks. They were tan in color of a roughly texture "lumpy" ware type with impressed letters reading "Berry's Premium". Similar bricks were found in the casting house stratigraphy of the Catoctin Charcoal Furnace, Stack No. 2 ("Isabella") building in the late 1850's (Orr and Orr, 1975). The one whole fire brick found measured  $8 \frac{3}{4}$ " x  $2 \frac{3}{4}$ " x 4". The bats were roughly, though not identically similar in 2 dimensions (width and Thickness). These were found in Feature 1X, a sandy lobe to accommodate the old springhouse stream and bathhouse drainage - see ground plan) and on top of Feature 1B in building rubble from post-destructive period. The whole fire brick came from the fill layer in Trench 1A hypothesized to have been filled in at the same time the springhouse was converted to a bathhouse.

### Conclusions

The post middle of the 1800's date for the firebricks help verify the date of the reconstruction of Feature believed to have taken place in the late 1800's. The common bricks analysed were probably made until the late 1800's with the wider bricks, often more orange in color and porous in texture, indicating an earlier style extending back to the beginning of the 1800's. All the wider bricks, though found in later contexts were definitely found in the builder's trench Feature 1C. Conversely, a smaller size brick found in the builder's trench Feature 1L might point to a late intrusion of that feature. Brick size, as such is unreliable when taken as a single criterion since bricks of differing sizes were used for different purposes during the same time period. However, we have observed that the common brick is generally larger in all dimensions in earlier colonial times and that the seriation trend was toward small and more compact bricks up to the present time. Because only a few bricks were obviously reconstructible from the brick bats it is assumed that most of the brick fragments were included in fillearth brought in from elsewhere - rather than representing, for example, an original brick springhouse floor. Also, the brick drain may have contributed some spalls and bats during its construction.